Telemetry Monitoring in the Acute Care Setting
An Integrative Review

Question: “What is the quantity, quality, and consistency of the evidence for the use of remote telemetry monitoring, as compared to the use of telemetry monitoring by monitor technicians, in the acute care setting?”

Results: Definitions in the literature for remote telemetry and telemetry monitoring remain ill-defined.\textsuperscript{1,9,12} Conflicting research evidence does not support one system of telemetry monitoring.\textsuperscript{12} Published clinical trials in hospital cardiac monitoring are almost nonexistent.\textsuperscript{4} Relevance of mid-1990 studies is questionable, as clinical environments and technologies have changed.\textsuperscript{4} Recent anecdotal evidence suggests monitor technicians, combined with standardized and integrated communication systems, may contribute to successful remote telemetry monitoring.\textsuperscript{3,9,10,12} Monitoring goals are different for each setting\textsuperscript{4,5,12} and only humans, not cardiac monitors, can determine the goals of monitoring for a patient.\textsuperscript{4,9} The human brain provides the most sophisticated dysrhythmias analysis,\textsuperscript{11} which seems to recommend monitor surveillance by qualified staff trained in the recognition of significant cardiac rhythm disturbances.\textsuperscript{9} However, responsibility for incorporating practice standards ultimately rests on the shoulders of nursing staff who attach patients to cardiac monitors and observe their ECG rhythms.\textsuperscript{5}

Based on the reviewed evidence, the following recommendations are offered for consideration:

- **Telemetry Staff Nurses**
  - Understand the delineation between monitor surveillance by non-RN monitor technicians and professional nursing care of the patient requiring telemetry monitoring.\textsuperscript{3,4,5,7,9}
  - Complete a comprehensive telemetry monitoring program and attend regular updates.\textsuperscript{4,6,12}
  - Become expert in recognizing cardiac dysrhythmias and use of monitoring equipment.\textsuperscript{1,4,9,13}
  - Mentor and support novice staff members and partner with monitor technicians in dysrhythmia recognition and monitoring equipment.\textsuperscript{4,5,9,10,12}
  - Be professionally accountable for dysrhythmia detection/intervention, review, documentation, and communication for all patients under their care.\textsuperscript{1,5,8,9,13}

- **Non-RN Monitor Technicians**
  - Under the supervision of a professional nurse, provide for a safe patient environment by clearly understanding roles, responsibilities, and activities of nurses and non-RN monitor technicians.\textsuperscript{3,4,5,6}
  - Complete a comprehensive telemetry monitoring program and attend regular updates.\textsuperscript{4,6,9,12}
  - Become proficient in recognizing significant dysrhythmias and use of monitoring equipment.\textsuperscript{4,8,9,11}
  - Partner with telemetry nurses in dysrhythmia recognition and monitoring equipment.\textsuperscript{9,10,12}
  - Effectively document and communicate dysrhythmia information to staff nurses, physicians, and other monitor technicians.\textsuperscript{1,9,10,12}

- **Nurse Educators**
  - Develop and present a comprehensive evidence-based telemetry monitoring program on a regular and ongoing basis, with incorporation of the following elements:\textsuperscript{3,4,5,7,9,10,12}
    - Patient & family information
    - Patient assessment & preparation
    - Patient monitoring & care
    - Expected & unexpected outcomes
    - Unit specific protocols
    - Patient & family information
    - Patient assessment & preparation
    - Patient monitoring & care
    - Expected & unexpected outcomes
    - Specific monitoring equipment
    - General ECG concepts
    - Specific ECG abnormalities

- **Nurse Managers**
  - Ensure that only patients requiring monitoring are placed on telemetry monitoring units.\textsuperscript{1,9,12}
  - Invest in efficient telemetry dysrhythmia detection systems.\textsuperscript{1,9,13}
  - Ensure a reliable staff communication process is in place that contributes to a safe and efficient telemetry monitoring environment.\textsuperscript{1,3,9,12}
  - Accountable for the monitoring and adherence of staff proficiencies.\textsuperscript{4}

- **Nurse Executives**
  - Medical center leadership is responsible for quality cardiac monitoring.\textsuperscript{4}
  - Accountable for ensuring unit specific and patient appropriate telemetry monitoring.\textsuperscript{1,4}
  - Champion the development of evidence-based monitoring standards, guidelines, protocols, and policies, as led by a group of expert nurse clinicians best able to analyze the conflicting research results.\textsuperscript{4}
  - Maximize the quality of care by utilizing innovative technologies and creative cost-saving strategies to provide for realignment of nursing personal to direct patient care activities.\textsuperscript{9,13}
Telemetry Monitoring in the Acute Care Setting
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Introduction: The human brain still provides the most sophisticated analysis of cardiac rhythms. Despite modern technological advances, the need for human oversight in ECG monitoring and interpretation is as important today as it was 40 years ago. Only expert RNs can juggle and integrate multiple patient care responsibilities without losing important information or missing significant needs. However, the current supply of expert clinicians has never been smaller. Telemetry monitoring technology continues to evolve, as does the patient monitoring environment. This updated integrative review will examine the quantity, quality, and consistency of the evidence for the use of remote telemetry monitoring systems, as compared to the use of dedicated monitor watchers, in the acute care hospital setting.

Evidence Search Strategies: An updated integrative review on the selected clinical topic was conducted in February 2013 to determine the quantity, quality, and consistency of the evidence on telemetry monitoring. This review focused on the comparison of remote telemetry monitoring to the use of telemetry monitoring by monitor technicians functioning as dedicated monitor watchers. An open year review of the research evidence was conducted via electronic databases (Pub Med, Ovid, Cochrane Library, CINAHL, and Yahoo) using the search terms of “remote telemetry”, “telemetry monitoring”, “dedicated monitor watcher”, “telemetry technician”, and “human technology interface”, either alone or in combination. This review yielded 28 relevant hits and, after eliminating 22 duplicates, 6 articles were selected for inclusion (See Appendix A, Electronic Database Search Methodology, Pages 11-12). After careful examination, 2 articles were eliminated, as they targeted inappropriate practice settings or were older than 1997. The remaining 4 articles pertained to the clinical area of inquiry and were reviewed in detail. Nine relevant articles from the 2009 review (counted as duplicates during the database search) were included in the updated 2013 review. The final 13 articles were ranked and graded using the CCIRES Evidence Leveling System and CCIRES Strength of Recommendation Taxonomy Evidence Grading tool (See Appendix B, Page 13).

The strength of the research evidence evaluated for this integrative review ranges from insufficient to fair, with the majority of the evidence as insufficient. Results limitations include research conducted mainly in the 1990s, variations in evidence methodology yielding inconsistent results, and a lack of current research studies examining this area of clinical practice. Additional limitations include the inability to accurately evaluate monitor technician effectiveness and patient outcomes from recent anecdotal reports of remote telemetry monitoring. However, the information presented in this review provides the best available evidence to date for clinicians examining the use of telemetry monitoring, remote telemetry monitoring, and dedicated monitor watchers.

Evidence Search Results: Definitions in the literature for remote telemetry and telemetry monitoring remain ill-defined. Published clinical trials in hospital cardiac monitoring are almost nonexistent. Relevance of mid-1990 studies is questionable, as clinical environments and technologies have changed tremendously over the last 20 years. The majority of the research involved dedicated nurse monitor watchers, with only one study examining the use of telemetry technicians. Anecdotal evidence over the last decade describes enhanced patient care by combining nurse-managed remote telemetry systems with monitor technicians functioning as dedicated monitor watchers. Therefore, professional organizations and clinical experts are currently unable to develop a formal guideline with levels of evidence supported by published research. Monitoring goals are different for each setting and only humans, not cardiac monitors, can determine the goals of monitoring for a patient. Clinical experts emphasize the need for medical and nursing leadership to evaluate individual monitoring environments and unique patient populations when choosing a telemetry monitoring system.
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Conclusions: After incorporating the 2013 evidence with the 2007 and 2009 reviews, the major conclusions remain unchanged and are as follows: Controversy still exists over the necessity for someone to watch the monitors at all times. Research studies pairing dedicated monitor watchers with remote telemetry do not detect any events independent of computerized systems and do not differ in RN notification time. Recent anecdotal evidence suggests monitor technicians functioning as dedicated monitor watchers, combined with standardized and integrated communication systems, may contribute to successful remote telemetry monitoring and improved patient outcomes. The conflicting research evidence does not support one sole system of telemetry monitoring, whether it is remote telemetry, pocket pagers, or monitor technicians. The human brain provides the most sophisticated dysrhythmias analysis, which seems to recommend monitor surveillance by qualified staff trained in the recognition of significant cardiac rhythm disturbances.

The simultaneous tasks of remote telemetry monitoring coupled with patient care has the potential to place unnecessary demands on nursing time and workload, negatively affect patient care, and offers multiple opportunities for communication errors or breakdown. Efficiency and quality of patient care can be enhanced by using a dedicated monitor watcher, such as a nurse or monitor technician proficient in dysrhythmia recognition, communication, and documentation. A partnership between the telemetry nurse and monitor technician facilitates a safe monitoring environment which frees the nurse to deliver other essential patient care. Individualized monitoring systems and an integrated communication cascade, coupled with a qualified nursing staff and a well-designed training program, will go far in ensuring safe and effective ECG monitoring of hospitalized patients. However, responsibility for incorporating practice standards ultimately rests on the shoulders of nursing staff who attach patients to cardiac monitors and observe their ECG rhythms.
Telemetry Monitoring in the Acute Care Setting

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Key Summary of the Evidence

- **Organizational Systems**¹,⁹
  - Efficient arrhythmia detection methods are needed to support staff nurses responsible for telemetry monitoring¹.
  - Reliable communication processes can contribute to a safe and efficient remote cardiac monitoring system¹,³.
  - Clear hospital policies ensure that only patients requiring monitoring are placed on telemetry¹,⁹.
    - The greatest need of a patient determines the patient’s placement⁹.

- **Financial Considerations**¹,⁶,⁹,¹³
  - Cost-benefit analyses are needed to assess the advantages and disadvantages of remote telemetry and other components of telemetry monitoring¹,⁶,¹³.
  - Financial cost of modest a 40-channel remote system with an annualized expenditure for 10 full-time equivalents for 7-day 24-hour coverage by monitor nurse and monitor technician⁹.
    - Can be used for thousands of patients annually⁹.
    - Indicates efficient management of resources⁹.
  - Innovative technologies, such as pocket pager systems (PPS), could reduce the need for monitor technicians (MT), allow cost savings, and/or provide for realignment of personal to direct patient care activities¹³.
    - MT are costly¹³.
    - MT may be counted in budgeted hours per patient day, thus reducing the number of nursing staff providing direct patient care¹³.

- **Nursing Leadership**³,⁴,⁹,¹⁰,¹²
  - Medical center leadership is responsible for maintenance and improvement of quality cardiac monitoring⁴.
    - Determine what staff proficiencies are required for each monitoring unit and patient population⁴.
    - Establish protocols governing roles and responsibilities for all telemetry staff:³,⁴,⁹,¹⁰,¹²
      1. Cardiac monitoring⁴.
      2. Documentation of ECG changes⁴,⁹,¹².
      3. Periodic documentation of appropriately set alarms and response to cardiac events⁴,⁹.

- **Nursing Implications**¹,⁴,⁵,⁹,¹⁰,¹²,¹³
  - Despite advances in technology, the need for human oversight in ECG monitoring interpretation is as important today as it was 40 years ago⁴,⁵.
    - Current supply of expert clinicians has never been smaller⁴.
  - Experienced and expert professional nurses play a key role in incorporating practice standards, monitoring arrhythmias, interpreting ECGs, and providing interventions to achieve prompt patient diagnosis and treatment¹,⁵,¹³.
    - Only expert RNs can juggle and integrate multiple patient requests and care needs without losing important information or missing significant needs¹.
  - Telemetry units are a realm of care with its own practice standards and nursing competencies that address the specific needs of patients who require this type of care⁹.
    - Nurse-managed discontinuation process ensured appropriate use of telemetry while preventing prolonged, unnecessary use⁹.
    - Physicians value the nurses’ ability to effectively make decisions associated with criteria based placement of patients, care management, and discontinuation of telemetry⁹.
Nursing responsibility of remote cardiac telemetry is more than isolated incidents of arrhythmia detection and intervention. Role involves managing a system that interfaces with technology and expert decision-making processes. RN is treating the monitor rather than the patient. Patient is now viewed through technology and interventions are based on information immediately available. Concurrent tasks of monitoring remote telemetry while delivering patient care have the potential to add significantly to RNs workload, negatively affect patient care, and offer multiple opportunities for communication errors or breakdown.

Monitoring nurse role definition should include an opportunity at beginning of the shift to:
- Assess telemetry patients
- Review the patients’ plan of care
- Communicate with staff about any patient concerns

Assists in understanding telemetry population activity levels and reduces phone calls and problem follow-up.

Telemetry Nurse/Monitor Technician Partnership
- Telemetry units have 2 key staff members:
  - Monitor nurses dedicated to the management of the remote telemetry process
  - Monitor technicians solely dedicated to the remote telemetry patients
- A telemetry nurse/monitor technician partnership facilitates a safe environment for cardiac monitoring in which nurse is free to deliver other essential care for the patient
  - Create an environment where nurse clinicians can consult with monitor technician regarding patient status and confidently determine best course of action to provide highest-quality care

Dedicated Monitor Watchers (DMW)
- Efficiency and quality of patient care can be enhanced when one person is assigned to watch the telemetry monitors
- Controversy still exists over the necessity for someone to watch the monitors at all times
- Potential monitor watchers include RNs, monitor technicians, nurse assistants; cross train unit secretary or telemetry technician

Dedicated Monitor Watcher (Monitor Technician)
- Monitor Technicians trained as DMW can deliver continuous observation of patient’s cardiac rhythm from a centralized location
- “Rover” Monitor Technician
  - Ensure proper lead placement on patients
  - Respond to remote equipment needs (such as battery changes)
- Expansion of the monitor technician role has dramatically reduced the number of leads off alarms and poor signal quality

Dedicated Nurse Monitor Watcher
- Surveillance of monitors for arrhythmias, ischemia, and QT prolongation were not detected by nurses giving direct patient care
- One study demonstrated that the presence of an RN monitor watcher was not associated with lower rates of most adverse outcomes evaluated
Telemetry Monitoring in the Acute Care Setting
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- Significant rhythm disturbances, including pauses of 2 seconds or greater and short runs of VT and SVT, were frequently missed when a dedicated RN/LPN monitor watcher and full disclosure were not in use.8
  - Settings with the best results had expert RNs with years of telemetry unit experience and minimal unit turnover.6
  - Greater accuracy in detection of clinically important arrhythmias and reduced incidence of sustained VT.5
  - Nurse monitor watcher can prevent sustained ventricular tachycardia on a telemetry unit.6
  - Detection of all dysthythmia events except life-threatening rhythms was significantly higher with dedicated monitor watchers than without.11

  o DMW Advantages.4,12,13
    - DMW skilled in ischemic ST segment changes may provide strong justification for staffing this position.4,12
    - Ensures that:4,12
      - Alarms are reviewed and validated.4,12
      - Warnings not triggered by alarms are identified.4
      - Subtle ECG changes/rhythms are detected early.12
      - Proper lead placement, signal quality, battery replacement, equipment gatekeeper, and alarm parameters.4,12
    - Frees nurses from monitor activities.4,12,13
      - Not cost effective/feasible to train all RNs to use monitor to fullest potential.4,12
      - Monitors cannot be watched by nurses giving direct patient care.4
      - Nursing staff is relieved of non-nursing activities.12,13
      - Nurses have time to verify alarms reviewed by DMW.13

  o DMW Disadvantages.1,2,4,10,11,12,13
    - Position is costly and superfluous with current sophisticated technology.4,11,13
      - Computerized systems may be superior to human observation in surveillance, notification, and accuracy of arrhythmia detection.4,12,13
        - Observes the equipment rather than patient.13
        - Multiple screen viewing causes fatigue and decreased vigilance.4,12
        - Majority of alarms are artifact and false/nuisance alarms.1,2,10
        - Difficulty discerning between high and low priority alarm sounds.2
        - Difficulty learning more than 6 different alarm signals.2
      - May be counted in budgeted hours per patient day and reduce level of nursing staff providing direct patient care.13
      - Presence may foster dependence and impede development of RN expertise.4,12

  o Alternatives to DMW.3,4,8,10,11,13
    - Multiple monitor screens on unit.3,4,10,12
    - Pagers for nurses that signal and display rhythm strip.3,4,13
      - RN providing care at a distance from central monitors may not hear alarms or view screens.11
      - Increased nurse-patient ratio with higher patient acuity decreases the likelihood of detection.11
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- State of the art and technologically advanced telemetry systems provide alternatives for continuous human observation of ECGs by DMW/monitoring technician3,4,8,13
  - Educate nurses to use technology to fullest potential4
  - Sophistication of alarm system affects dysrhythmia detection11
  - Frequent and atypical/poorly defined waveforms may decrease likelihood of detection13

- Healthcare and Society Technology1,3,4,8,9,11,12,13
  - Adequate human surveillance of monitors 24 hours a day is needed by personal trained and qualified in recognition of clinically significant cardiac rhythm disturbances (ACC Committee of Emergency Cardiac Care)8
    - Human brain still provides the most sophisticated analysis of cardiac rhythms11
    - Complex device technology calls for expertise in ECG analysis to evaluate device malfunction and non-optimal programming4
    - When a RN/LPN DMW and full disclosure are not in use, telemetry results should be accepted with caution and attempts should be made to improve monitoring8
  - Other factors (type and frequency of cardiac events, intensity of nursing care responsibilities) can affect accuracy of dysrhythmia detections11

- Goals of Telemetry Monitoring4,5,12
  - Goals of monitoring are different for every unit environment4,5,12
    - Only humans, not cardiac monitors, can determine patient monitoring goals4

- Remote/Flexible Telemetry Monitoring1,3,9,12
  - Definition and Description:9,12
    - Monitoring of low-risk patients and their vital signs or cardiac rhythm remotely, via a network connection to a central workstation, by personnel who are not directly involved with the patients’ care1,9,12
    - Workstations may be located in a variety of locations, such as designated monitoring area on the unit, off the unit, or within an ICU12
  - Integrity of remote telemetry monitoring hinges on 2 factors:1
    1. Ability to detect arrhythmias in early stages1
    2. Success of follow-up process when lethal arrhythmias occur1
  - Remote monitoring center is a hub for monitoring, communication, and equipment dispensation, tracking, and maintenance3,10
  - Remote cardiac telemetry process increases availability of cardiac telemetry service, standardized telemetry admission process, and eliminates unnecessary patient transfers9
  - DMW can deliver continuous observation of patient’s cardiac rhythm from a centralized location12
    - The majority of remote telemetry alarms are inconsequential and, if not screened by a DMW, places unnecessary demands on RN time1,10
    - Communication between the monitor watcher and the bedside nurse is essential for remote cardiac monitoring to be successful1,12
  - RN is treating the monitor rather than the patient1 (1)
    - Patient is now viewed through technology and interventions are based on information immediately available1
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➢ Standardized and Integrated Communication Processes\(^3,9,12\)
  o A seamless and flexible communication system such as remote monitoring can change the communication cascade and create increased efficiency and more consistent response to monitor-sensed rhythm changes\(^3\)
  o Communication between the monitor watcher and the bedside nurse is essential for remote cardiac monitoring to be successful\(^12\)
  o **Computerized processes can ensure:**\(^9\)
    ▪ Correct implementation of medical orders\(^9\)
    ▪ Appropriate placement of patients\(^9\)
  o **Phone Communication Processes**\(^9\) *(Also See Intercom and Phone Lines Section)*
    ▪ In-house cellphone to provide direct and expedient communication between monitor nurse, primary nurse, and monitor technician\(^9\)
    ▪ Designated landline emergency phone with a unique-sounding ring (looks and sounds different than other unit based phones) and is answered immediately\(^9\)
      • Used for cardiac arrhythmia alerts to primary unit by monitor technician\(^9\)
      • Monitor nurse uses both a cell phone and designated landline phone\(^9\)
  o **Intercoms and Phone Lines**\(^3,9,12\)
    ▪ Reinforce nurse pagers with emergency intercom phones for life-threatening dysrhythmias\(^3,12\)
      • Use dedicated emergency intercom phones with distinct alarms that are centrally located on each remote unit\(^3\)
      • Practice drills with special cell phones and landline phones to instill confidence in the system and best practice among caregivers\(^9\)
    ▪ Use dedicated phone lines for nonlethal alarm conditions and nonurgent MT-to-nurse communication\(^3,9,12\)
  o **Pocket Paging System (PPS)**\(^3,13\)
    ▪ An integrated communication cascade with direct nurse pagers provides timely, mobile communication\(^3\)
      • Patient data seek the nurses\(^3\)
    ▪ 1998 research study comparing Monitor Technician (MT) System to PPS demonstrated:\(^13\)
      • PPS is a viable approach to arrhythmia detection and communication\(^13\)
      • All arrhythmia events activated an alarm via the computerized arrhythmia detection system\(^13\)
      • MT did not detect any events independent of the computerized system\(^13\)
      • Length of time to notify RN was within 0 to 1 minute for both systems\(^13\)
      • PPS necessitates reassignment of traditional MT activities\(^13\)

➢ Staff Education and Training for Telemetry Monitoring\(^4,5,7,8,10,12\)
  o Telemetry monitoring education should include specific critical procedural and educational elements/information for staff orientation, competencies, and updates\(^4,5,7,10,12\)
    ▪ Education should focus on specific ECG abnormalities, general ECG concepts, unit protocols, and specific monitoring skills, with didactic testing and hands-on practice\(^4,7,10,12\)
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- **Quality Improvement Strategies**<sup>5,8</sup>
  - Good models of quality telemetry monitoring are often not followed<sup>8</sup>
  - Quality improvement programs ensure safe and effective ECG monitoring<sup>5</sup>

- **Research**<sup>1,4,6,11,13</sup>
  - Published clinical trials in hospital cardiac monitoring are almost nonexistent<sup>4</sup>
  - Relevance of studies in the mid-1990s is questionable, as current clinical environments and monitoring technologies have changed<sup>4</sup>
  - It is not possible to develop a formal guideline with levels of evidence supported by published research<sup>4</sup>
  - Research to date has not shown that prophylactic monitoring has resulted in improved patient care standards<sup>1</sup>
  - Further research is needed to explore new monitoring technology, DMW roles and alternatives, cost benefit analyses, nurse response time measurements, and patient outcomes<sup>6,11,13</sup>
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2009/2013 Combined Reference List


## Appendix A: Electronic Database Search Methodology

Evidence Search topic: “What is the quantity, quality, and consistency of the evidence for the use of remote telemetry monitoring, as compared to the use of telemetry monitoring by monitor technicians, in the acute care setting?”

Date(s): February 5, 2013

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# Telemetry Monitoring in the Acute Care Setting

## An Integrative Review

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**Articles from 2013 Update: 4**
**Articles from 2009 Integrative Review: 9**
**Total Articles Included in 2013 Integrative Review Update: 13**

**Inclusion Criteria:** Acute care settings; telemetry monitoring, remote telemetry monitoring; onsite telemetry monitoring, telemetry technicians (tele techs); dedicated monitor watchers (DMW) (nurses and tele techs); alarm notification systems, definitions of DMW and/or tele techs; human technology interface

**Exclusion Criteria:** Settings other than acute care; emergency department/room, monitoring systems other than telemetry; monitoring by persons other than tele techs or DMW or nurses (physicians, etc.), articles older than 1997

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Electronic Database Search Methodology Form created by C. Crawford, RN, MSN, ©Kaiser Permanente Southern California, Regional Nursing Research Program, March 21, 2011

Adapted from Toolkit for Promoting Evidence-Based Practice Form 4/Appendix G © Research, Quality and Outcomes Management, Marita G. Titler, PhD, RN, FAAN, Director, Research, Quality and Outcomes Management

## Appendix B: Evidence Leveling and Grading

### CCIRES© Evidence Leveling System (ELS)
Adapted from AACN Evidence Leveling System (2009) and Canadian Medical Association & Centre for Evidence-Based Medicine, Levels of the Evidence (2001)

<table>
<thead>
<tr>
<th>LEVEL</th>
<th>DESCRIPTION</th>
<th>RELEVANT ARTICLES</th>
<th>ARTICLE NUMBER</th>
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<tr>
<td>A</td>
<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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<tr>
<td>B</td>
<td>Well-designed controlled studies, both randomized and nonrandomized, prospective or retrospective studies, and integrative reviews with results that consistently support a specific action, intervention, or treatment</td>
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<td>#6, #8, #11, #13</td>
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<tr>
<td>C</td>
<td>Qualitative studies, descriptive or correlational studies, integrative reviews, systematic reviews, or randomized controlled trials with inconsistent results</td>
<td>1</td>
<td>#1</td>
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<tr>
<td>D</td>
<td>Peer-reviewed professional organizational standards, with clinical studies to support recommendations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>Theory-based evidence from expert opinion or multiple case reports, case studies, consensus of experts, and literature reviews</td>
<td>5</td>
<td>#2, #4, #5, #7, #10</td>
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<tr>
<td>MA</td>
<td>Manufacturer’s recommendation; Anecdotes</td>
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<td>#3, #9, #12</td>
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<tr>
<td><strong>Total</strong></td>
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</table>

* A large sample has adequate power to detect the observed effect with confidence (as seen in significant Confidence Intervals). A small sample may lack confidence in the power of the desired effect (Polit & Beck, 2008)

Designed by Emma M. Cuenca and Cecelia L. Crawford, Collaborative Center for Integrative Reviews and Evidence Summaries (CCIRES); ©Kaiser Permanente SCAL Regional Nursing Research Program, May 2011

### CCIRES Strength of Recommendation Taxonomy (SORT) for Grading the Evidence

Evidence graded as “Good” (1) = 0 articles  
Evidence graded as “Fair” (2) = 5 articles  
Evidence graded as Insufficient (3) = 8 articles

**SORT: Consistency Across Studies**

| Inconsistent | Considerable variation among study findings and lack of coherence |

<table>
<thead>
<tr>
<th>Quality/Strength of the Evidence</th>
<th>SORT Definition: Summary of the Strength of the Body of Evidence</th>
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<tr>
<td>3 = Insufficient</td>
<td>The summary of the body of the evidence based on consensus, usual practice, opinion, disease-oriented evidence* and demonstrates good quality patient-oriented evidence*, case series, and case studies</td>
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</tbody>
</table>

*Patient-oriented evidence measures outcomes that matter to patients: morbidity, mortality, symptom improvement, cost reduction, quality of life.  
#Disease oriented evidence measures intermediate, physiologic, or surrogate endpoints that may or may not reflect improvements in patient outcomes (i.e. blood pressure, blood chemistry, physiological function, and pathological findings)

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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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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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