CriticalCareNurse
The journal for high acuity, progressive, and critical care

Fostering Synergy: A Nurse-Managed Remote Telemetry Model

Terry Reilly and Diane Humbrecht

Crit Care Nurse 2007;27:22-33

Published online http://www.cconline.org

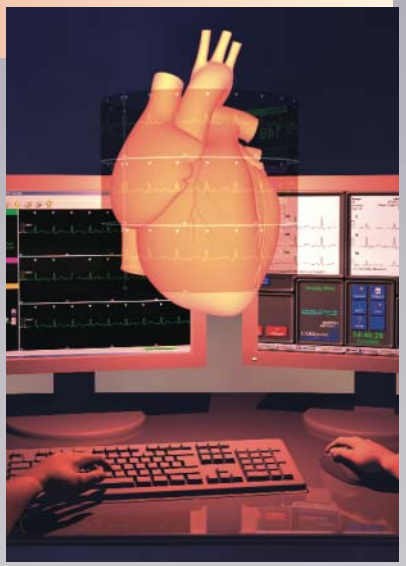
Critical Care Nurse is the official peer-reviewed clinical journal of the American Association of Critical-Care Nurses, published bi-monthly by The InnoVision Group 101 Columbia, Aliso Viejo, CA 92656. Telephone: (800) 899-1712, (949) 362-2050, ext. 532. Fax: (949) 362-2049.

AMERICAN ASSOCIATION of CRITICAL-CARE NURSES

Fostering Synergy

A Nurse-Managed Remote Telemetry Model

Terry Reilly, RN, MSN, CCRN
Diane Humbrecht, RN, BSN, C



The challenge of aligning patients' needs, clinical technology, and scarce resources has necessitated several levels of care in hospitals. As the demand for cardiac monitoring of patients who are acutely ill yet in stable condition has increased in the past decade, an intermediate level of care has emerged. In response, the American College of Cardiology published guidelines[1] for different levels of cardiac monitoring, and the Society of Critical Care Medicine[2] recommended admission and discharge criteria for intermediate care units. The American Association of Critical-Care Nurses (AACN) characterized this less acute end of the critical care continuum that includes all intermediate, step-down, and telemetry units as *progressive care*,[3] a realm of care with its own practice standards and nursing competencies that address the specific needs of patients who require this type of care. Despite establishment of this additional level of care, demands for cardiac telemetry monitoring in many hospitals have continued to expand beyond the physical capacity to accommodate the number of patients who could benefit from cardiac telemetry monitoring. As a result, healthcare institutions have sought broader solutions to align patients' needs for cardiac telemetry monitoring with available hospital resources.

Abington Memorial Hospital, a tertiary care facility in Abington, Pa, experienced a capacity problem with cardiac telemetry despite the

* This article has been designated for CE credit. A closed-book, multiple-choice examination follows this article, which tests your knowledge of the following objectives:

1. Identify issues related to development and implementation of a remote telemetry unit in a tertiary care facility
2. Describe the admission and discharge criteria for the remote monitoring units
3. Discuss common causes for patient deterioration and what interventions are most likely to identify those at risk

Authors

Terry Reilly is nurse director of critical care services at Abington Memorial Hospital in Abington, Pa. She was the project manager throughout the development and implementation of the nurse-managed remote telemetry model.

Diane Humbrecht is the nurse manager of the intermediate cardiovascular unit at Abington Memorial Hospital. She served as a leader and clinical resource throughout the development, implementation, and monitoring of this model.

Corresponding author: Terry Reilly, Nurse Director, Critical Care Services, Abington Memorial Hospital, 1200 Old York Rd, Abington, PA 19001-3788 (e-mail: Treilly@AMH.org).

To purchase electronic or print reprints, contact The InnoVision Group, 101 Columbia, Aliso Viejo, CA 92656. Phone, (800) 899-1712 or (949) 362-2050 (ext 532); fax, (949) 362-2049; e-mail, reprints@aacn.org.

availability of numerous critical and intermediate care units. Patients often required cardiac monitoring regardless of the healthcare reason that brought them to the hospital. This demand automatically precipitated an excessive number of admissions to the intermediate care units, causing slow throughput of patients and continuous concerns about patients' safety and satisfaction.

Hospital administrators asked a multidisciplinary team to explore options to improve efficiencies for this group of patients. The team identified various options in the literature search that addressed safe placement of patients, telemetry admission criteria, and effective management of patients. One possible solution was remote cardiac telemetry. *Remote telemetry* refers to monitoring of patients in a central location by personnel who are not directly involved with the patients' care.[4]

Another element viewed as helpful in this solution was incorporation of the AACN Synergy Model for Patient Care,[5] which provided the perfect framework for developing a solution. In this model, synergy emerges from the interaction between the needs of a patient and the characteristics of the patient's nurse and results in optimal outcomes for the patient. After initial review, the team recommended remote cardiac telemetry monitoring as a solution, while cautioning hospital administrators that an effective process was essential to ensure appropriate use of telemetry. In this article, we summarize the development, successful implementation, and nurse management of a remote telemetry service that uses the AACN Synergy Model as the framework.

Literature Search

Risks to Patients

In numerous studies,[6-10] researchers have concluded that patients with ischemic syndrome, nonspecific electrocardiographic changes, atypical chest pain, or noncompromised heart failure who are monitored via cardiac telemetry are at low risk for development of an arrhythmic event that would require clinical intervention. In a review, Estrada et al[6] concluded that monitored patients whose clinical condition deteriorated were recognized most often through clinical assessment without the contribution of cardiac monitors. Clinical judgment offers the greatest opportunity to rescue compromised patients. A nurse's ability to integrate knowledge and understand the impact of multisystem influences on a patient is central to clinical judgment within the AACN Synergy Model.[5]

Admission Criteria

With appropriate admission criteria, a patient who is at risk for cardiac arrhythmias can be differentiated from a patient who is unlikely to experience arrhythmic events that would require intervention. Curry et al[11] found that patients who were monitored with cardiac telemetry on the basis of established admission criteria experienced more significant arrhythmic episodes and resultant therapy than did patients in whom cardiac telemetry monitoring was used without criteria.

These results support the conclusion that patients with specific low-risk cardiac diagnoses rarely experience significant arrhythmias. The assessed risk for serious arrhythmia can be used to predict a patient's course of illness. According to the AACN Synergy Model, predictability is a summative characteristic that allows one to expect a certain trajectory, or course of illness.[12] The healthcare team must define and use criteria so that patients with the greatest cardiac risk are correctly monitored and the cardiac telemetry resources are appropriately used.

Remote Monitoring Process

In a review, Billinghurst et al[10] described a staff of critical care nurses assigned to monitor the cardiac rhythms of patients in a remote unit while the nurses cared for patients in the cardiac care unit. The nurses' response to the remote telemetry alarms correlated inversely with the workload of each nurse. Billinghurst et al concluded that the nurse responsible for monitoring the cardiac rhythm of a patient who is in a remote unit must be an experienced clinician with time to review the care of the telemetry patient and communicate concerns to the patient's primary nurse.

Gross et al[13] described a process in which an advanced practice nurse provided support to primary staff nurses in the cardiac management of patients being monitored via remote telemetry. The advanced practice nurse used established criteria routinely to determine patients' need for continued telemetry. This process resulted in safe and efficient management of patients and a significant decrease in the mean cardiac telemetry monitoring time for that group of patients. The care management focused on supporting both patients and the patients' primary nurses. It also highlighted the importance of using criteria to manage the length of time that a patient is monitored via telemetry.

Framework for Patients' Care

Our team confidently concluded that with established admission and discharge criteria, low-risk patients could safely be monitored for dysrhythmias via remote cardiac telemetry. The team used the findings in the literature to develop the criteria and structure so that the appropriate patients could be managed safely and effectively outside the intermediate care units.

The AACN Synergy Model supports the appropriate framework for a nurse-managed remote telemetry process. Synergy combines the actions of both nurses and patients, recognizing that dynamic characteristics of patients drive a nurse's competencies and enable patients' outcomes to be optimized on 3 levels: outcomes pertaining to the patient, to the nurse, and to the healthcare system.[12] Placing patients in the center and developing the care delivery and processes around them optimizes safety, satisfaction, and appropriate management of resources.

Development of the Criteria for Level of Care: Telemetry and Intermediate Care Levels

The team developed 2 sets of cardiac monitoring criteria for differentiating intermediate care patients from remotely monitored patients in a general medical, surgical, orthopedic, or neurology unit. The criteria clearly define the low-risk patients who could appropriately be assigned to remote cardiac telemetry (Table 1). The criteria for initiating telemetry monitoring include subsets of admitting diagnoses associated with a lower risk for cardiac arrhythmia. The criteria for the intermediate-care level remained unchanged. In addition, a specific tool was created to differentiate the admission criteria between the 2 levels so that nurses could consistently assign patients to the type of monitoring appropriate for the patients' needs (Table 2). The discontinuation criteria define either return to normal measurements or the absence of arrhythmia. The medical staff, nursing governance structure, and an ad hoc bed management team approved these sets of criteria for implementation.

Implementation of the Model Initiation of Telemetry

A physician admits patients to telemetry via computerized order entry. An assigned progressive care nurse (monitor nurse) is dedicated to the management of the remote telemetry process. This monitor nurse reviews each patient's admission information and uses the established criteria to determine if the patient is appropriate for remote cardiac telemetry monitoring or requires the intermediate care level. The skills expected of the progressive care nurse include proficiency in arrhythmia interpretation, Advanced Cardiac Life Support, management of cardiopulmonary emergencies, and standardized interventions to stabilize patients' conditions and transfer patients to a higher level of care.[3]

The 40-channel centralized monitor system has a monitor technician solely dedicated to the remote telemetry patients. This monitor technician is a trained technician who has demonstrated clinical competency in interpreting cardiac monitor rhythms accurately. The monitor nurse supports the monitor technician by validating appropriate interpretations of rhythms, troubleshooting system problems, and reviewing appropriate documentation.

Synergy at Work

Once a patient is appropriately designated for remote telemetry care, the patient is assigned to the specialty unit that will best meet the patient's care needs. This placement method enables the Synergy Model to emerge through system thinking and application. For instance, if a patient has a fractured hip, the patient is admitted to the orthopedic unit. The monitor nurse assesses the patient's characteristics by using current clinical information and decides appropriate placement. The primary nurse in the unit where the patient is placed supervises and manages that patient's plan of care. The monitor nurse acts as a cardiac care resource to the primary nurse, discusses cardiac care with the physician when necessary, and addresses the need for continued telemetry. This collaboration between the nurses fosters synergy by aligning the complex needs of the patient with the achievement of common goals for the patient, the patient's family, and the healthcare team. The patient is supported in an environment where the nurse and other healthcare professionals are best able to meet the patient's care needs.

Discontinuation of Telemetry

The monitor nurse evaluates each telemetry patient 24 hours after the start of telemetry, and every 12 to 24 hours thereafter, to determine the patient's continued needs for telemetry. This nurse determines if the telemetry could safely be discontinued as defined in the established

Table 1 Remote monitoring in the medical-surgical units: admission and discontinuation criteria

Admission/initiation criteria	Discontinuation criteria
Rule out myocardial infarction/chest pain Presence of 1 or more of the following conditions Troponin <0.2 µg/L Nonspecific changes on electrocardiogram Absence of chest pain Low suspicion of cardiac origin	Continued absence of chest pain 2 sets of troponin values <0.2 µg/L Systolic blood pressure ≥90 mm Hg
Congestive heart failure (includes chronic obstructive pulmonary disease, shortness of breath, dyspnea) Noncompromised cardiopulmonary equilibrium Findings on radiograph indicating congestive heart failure Troponin <0.2 µg/L No requirement inotropic agents or nesiritide	24 h free of dysrhythmia 24 h of controlled atrial dysrhythmia
Atrial dysrhythmia Atrial fibrillation, tachycardia, or paroxysmal atrial fibrillation Preexisting history of atrial dysrhythmia After electrical cardioversion or ablation Sinus tachycardia associated with underlying disease Hemodynamic status stable	24 h with rate controlled or cardioversion 24 h of return to normal sinus rhythm or baseline
Syncope No witnessed loss of consciousness Low probability of cardiac origin Rule out cerebrovascular accident/temporary ischemic attack with syncope	24 h free of dysrhythmia or with return to baseline rhythm 24 h free of syncope No orthostatic hypotension (cardiogenic)
Rule out pulmonary emboli Troponin <0.2 µg/L	24 h free of dysrhythmia or with return to baseline rhythm
Drug overdose or intoxication Low probability of associated cardiac dysrhythmia Not associated with acute illnesses such as dehydration, vomiting, or diarrhea Potassium 2.0-2.5 mmol/L (only with treatment already started or >2.5 mmol/L or <6.8 mmol/L) All patients must be clinically assessed	Serum level of potassium returns to normal range 24 h free of dysrhythmia or with return to baseline Cause of metabolic disturbance corrected or returned to baseline values
Trauma Must be a certified trauma unit Low probability of cardiac contusion (echo driven) No creatine kinase measurements required	24 h free of dysrhythmia
Before open heart surgery Hemodynamic status stable Monitor nurse will complete preoperative education	Hemodynamic status stable
Pacer/implantable cardioverter defibrillator Generator change only; no new wires	Captures appropriately

criteria and notifies the physician when telemetry is discontinued on the basis of the established criteria.

Communication Processes

Computerized processes standardize communication to ensure correct implementation of medical orders and appropriate placement of patients. When a physician orders telemetry monitoring, the monitor nurse is notified of the order and immediately reviews the patient's information in the clinical system to determine appropriate placement. In-house cell phones provide direct and expedient communication between the monitor nurse, the primary nurse, and the monitor technician. If a patient experiences a cardiac arrhythmia, the monitor technician calls the primary unit, and the monitor nurse uses both a cell phone and a designated landline emergency phone with a unique-sounding ring. This landline phone looks and sounds different than other unit-based phones, so when the designated emergency phone rings, a staff member answers immediately,

Table 2 Tool used to differentiate the admission criteria between intermediate care unit and remote telemetry

Telemetry admission criteria*		
*Refer to unit structure standards for more specific criteria		
	CVU	Remote telemetry
Rule out MI	Yes	Yes, troponin <0.2 ng/mL†
Unstable angina	Yes	No
Cardiac dysrhythmia	Yes	Controlled atrial
CHF	Yes	Noncompromised
Metabolic disturbances with K^+ levels >2.5 and <6.5	Yes	Yes
Patients with an existing ICD	Yes	Yes
Post-op ICD, generator change only	Yes	Yes
Post-op ICD, new or repositioned wire	Yes	No
Syncope patient	Yes	Low prob cardiac event
Pericarditis	Yes	Yes
Drug overdose	Yes	Yes
Hypotension	Yes	Yes
S/P cardiac cath without intervention	Yes	Yes
S/P cardiac cath with intervention(angioplasty)/PFO	Yes	No
S/P EPS	Yes	Only if negative
S/P ablation	Yes	Yes
S/P elective cardioversion	Yes	Yes
S/P permanent pacemaker	Yes	Generator chg only
Preop cardiac surgery patients	Yes	Yes
S/P cardiac surgery patients	Yes	No
Trauma patients	Yes	Yes 3W and 3H only
Infusions		
NTG (max limit 75 µg/min)	Yes	No
Cardizem (max limit 15 mg/hr)	Yes	No
Dopamine (max limit 5 µg/kg/min)	Yes	No
Dobutamine (max limit 10 µg/kg/min)	Yes	No
Milrinone	Yes	No
Pronestyl	Yes	No
Lidocaine	Yes	No
Amiodarone	Yes	No
Tikosyn	Yes	No
Corvert	Yes	No
Natrecor	Yes	No
Aggrastat	Yes	No
ReoPro	Yes	No
Flolan	Yes	No

Considerations

Bed allocation will continue to be triaged and assigned through the CVU bed management nurse.
Call CVU staff for specific patient questions.
†If the second troponin is "+" at discretion of telemetry RN/MD to determine move to CVU based on overall assessment of patient.

Abbreviations: cath, catheterization; CHF, congestive heart failure; chg, change; CVU, cardiovascular unit; EPS, electrophysiological studies; ICD, implantable cardioverter/defibrillator; K^+, potassium; max, maximum; MD, physician; MI, myocardial infarction; NTG, nitroglycerin; PFO, patent foramen ovale; post-op, postoperative; prob, probability of; RN, registered nurse; S/P, status post; +, positive.
Generic names: Aggrastat, tirofiban hydrochloride; Cardizem, diltiazem hydrochloride; Corvert, ibutilide fumarate; Flolan, epoprostenol sodium; Natrecor, nesiritide; Pronestyl, procainamide hydrochloride; ReoPro, abciximab; Tikosyn, dofetilide.

Reprinted with permission from Abington Memorial Hospital, Abington, Pa.

Table 3 Total admissions and mean monitoring time by diagnosis in 2004

	Intermediate care unit		Remote telemetry units	
Diagnosis	Total No. of patients	Mean duration of monitoring, h	Total No. of patients	Mean duration of monitoring, h
Atrial fibrillation	382	79.71	157	50.22
Open heart surgery	214	104.80	0	0.00
Congestive heart failure	429	89.54	250	45.56
Dysrhytymia	301	60.84	246	39.86
Implant	105	53.83	14	58.80
Other	370	63.56	695	39.26
Rule out myocardial infarction	1578	50.88	720	33.94
Syncope	307	58.42	358	42.74
Trauma	25	48.66	53	31.50
Total	**3711**	**64.19**	**2493**	**39.55**

obtains necessary information, and responds appropriately to the patient. The monitor nurse also responds immediately to the patient. Practice drills with the special phone and evaluations of nurses' responses have provided confidence in the system and best practice among caregivers.

Each remote telemetry unit has an interactive cardiac monitor that displays a patient's cardiac rhythm so that physicians and nurses in these remote units can access current cardiac rhythms and archived information about the patient. A basic cardiac monitoring course is offered to the primary nurses, but these nurses are not expected to interpret the information supplied by the cardiac monitors. The monitor technician collects both routine and changing cardiac monitoring information on each patient, and this documentation is placed in the patient's chart at the end of each shift. If a patient's clinical status deteriorates for any reason, the monitor nurse works with the primary nurse and physician to manage the patient's changing needs and facilitates the patient's transfer to a higher level of care if needed.

Outcomes and Results

Efficiency of the Model

The remote cardiac telemetry process increased the availability of cardiac telemetry service, standardized the telemetry admission process, and eliminated unnecessary transfers of patients. Throughout the 2004 calendar year, 2493 patients were monitored via remote telemetry (Table 3), reflecting a 38% increase in the number of admitted patients who required telemetry monitoring in 2003. This increase was a multifaceted growth associated with a 4.5% increase in hospital admissions, an expanding cardiac service, and (more significantly) an aging population of patients with cardiac comorbid conditions who required medical care for other reasons.

Telemetry monitoring service remained consistently available for both the remote and intermediate care levels throughout this period despite the tremendous amount of use. The nurse-managed discontinuation process ensured appropriate use of telemetry while preventing prolonged, unnecessary use.

The mean duration of telemetry was consistently less in the remote telemetry group than in the cardiac intermediate care group (Figure 1). This outcome is attributed to the less acute cardiac disease among the remote telemetry patients compared with the intermediate care patients and to the persistent process management. The mean telemetry time for patients in the intermediate care unit was 3.9 hours longer in 2004 than in 2003. This increased telemetry time for intermediate care patients reflected the greater cardiac care management consolidated among patients in the intermediate care units.

The combined mean monitoring time for all telemetry patients decreased by 6 hours (Figure 2) after implementation of the remote telemetry model. The improved efficiencies for use of telemetry are realized; the hospital continues to provide cardiac telemetry service to significantly more patients without expanding the capacity of its intermediate

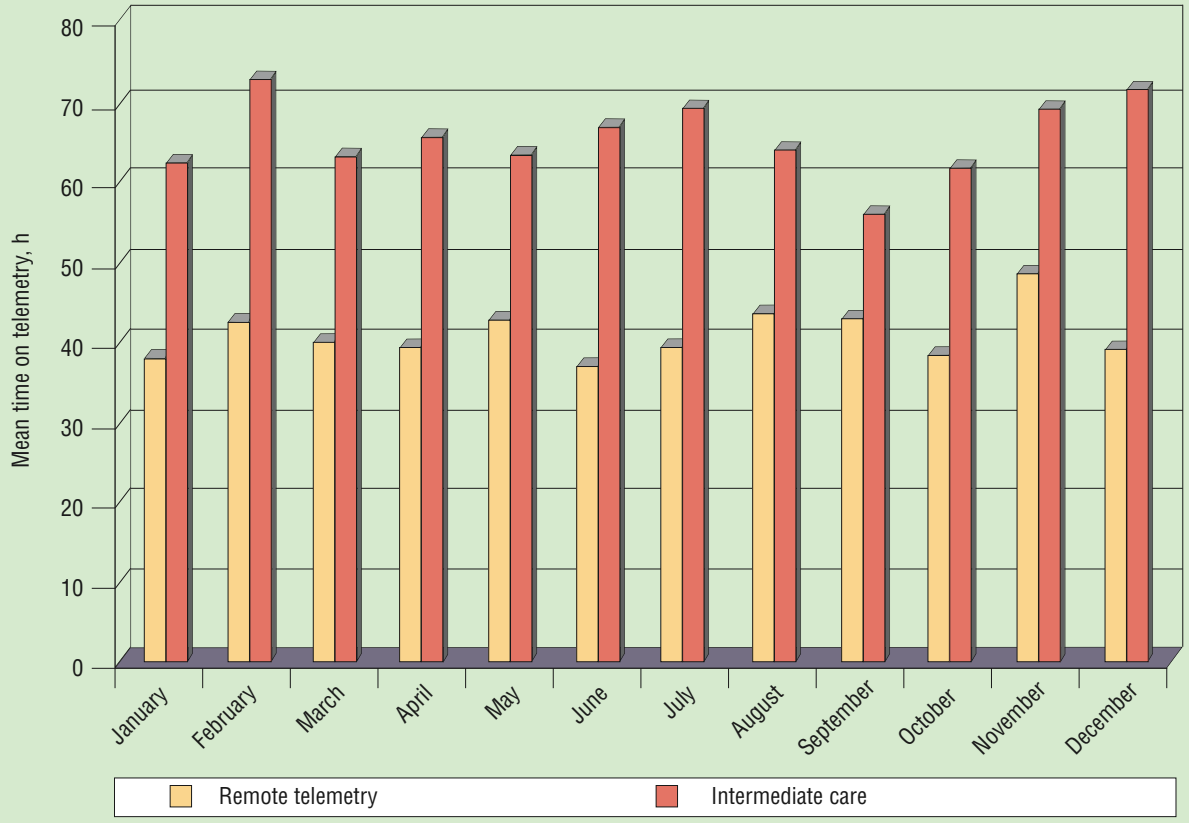


Figure 1 Mean hours per patient of monitoring each month: remote telemetry versus intermediate care unit.

Figure 2 Mean time on telemetry before and after implementation of remote monitoring.

care units. Implementation of the model also decreased the number of transfers of patients and costs for bed management by eliminating the transfer of patients when telemetry monitoring is discontinued. Telemetry use did not significantly improve emergency department throughput, however, because the number of general emergency department admissions also increased substantially during this period and in-house bed capacity remained constant. The number and mean telemetry time of patients managed with remote telemetry remained consistent throughout 2005.

Effectiveness of the Model

To evaluate the clinical effectiveness of this model, the team reviewed the care of all remote telemetry patients who were upgraded to either critical care or intermediate care. A retrospective chart review of each case included the patient's demographics, diagnosis, reason for transfer, destination, clinical status, mortality, the name of the person who initiated the transfer, and the appropriateness of admission to remote telemetry. This review was designed to expose problems associated with either the criteria or the process.

From January 1 through December 31, 2004, 168 (6.7%) of the 2493 patients admitted to remote telemetry required transfer to a higher level of care (Table 4). The monitor nurse was most often the provider who initiated the transfer from remote telemetry to the intermediate care unit. The 2 identified reasons that patients were upgraded to the intermediate care unit were both based on established criteria. Examples include need for different treatments such as a medication infusion that was not permitted in the remote telemetry unit or a need for more frequent assessments than were appropriate in a medical-surgical unit. This upgrade process ensured that the primary nurse was not practicing beyond the established level of care for a medical-surgical unit.

Table 4 Telemetry upgrades January to December 2004

Characteristic	Value
Total No. of patients	2493
Total No. (%) of upgrades	168 (6.7)
Diagnosis, No. of patients	
Congestive heart failure (shortness of breath, chronic obstructive pulmonary disease)	31
Dysrhythmia (33 with atrial fibrillation)	52
Other	21
Rule out myocardial infarction (chest pain, angina)	44
Syncope	20
Reason, No. of patients	
Increased monitoring	110
Increased treatment	58
Transferred to, No. of patients	
Step-down unit	105
Critical care unit	63
Transferred by whom?	
Physician/nurse	Most patients transfered to critical care unit
Nurse	Most patients transferred to step-down unit

When a patient was upgraded to critical care, the physician and the monitor nurse always collaborated. Patients who required transfer to critical care had experienced some level of respiratory, cardiovascular, or neurological deterioration. Respiratory compromise was the most common reason for patients to be transferred to critical care. In this review, each upgraded patient had experienced a clinical change that was associated with progression of the patient's health disorder or disease. Neither the criteria nor the nurse management processes contributed to any associated morbidity or mortality in the remote telemetry patients. The number of and reasons for upgrades also remained consistent throughout the 2005 calendar year, reflecting continued effectiveness of the process.

Discussion

Improved Telemetry Service

The expanded telemetry service has provided safe and efficient telemetry monitoring to significantly more patients than the previous process did. But an outstanding question has been raised in both the literature and at our hospital about appropriate use versus overuse of cardiac telemetry. Dawson and Runk[14] suggested the appropriateness and effectiveness of telemetry use in hospitals varied depending on process and practice. Inappropriate telemetry monitoring most often is associated with ineffective criteria for admission to telemetry, lack of adherence to criteria, lack of available alternative beds, and the physician's or patient's preference. Dawson and Runk recommended essential collaboration between nurses and physicians, clinical support for

inexperienced nurses, and individualized evaluation of each patient who is monitored via cardiac telemetry.

Our remote cardiac telemetry service can be deemed appropriate on the basis of these recommendations and can be appreciated on several levels. The financial cost of a modest 40-channel remote system with an annualized expenditure for 10 full-time equivalents for 7-day 24-hour coverage by the monitor nurse and the monitor technician that is used for thousands of patients annually indicates efficient management of resources. Effective bed use has allowed appropriate use of intermediate-level beds, encouraged improved continuity of care, and provided less opportunity for miscommunication during hand-off of patients. With this remote telemetry service, the right patient is assigned to the right bed on the basis of individualized evaluation of each patient and established criteria. The discontinuation criteria prevent prolonged misuse of the telemetry service. Appropriate placement of patients improves physicians' efficiencies in daily rounds and, more importantly, in responding to changing needs of patients. The improved telemetry service not only fosters synergy through the interaction between nurses and patients but expands synergy into the logistics of placement of patients and interdisciplinary care delivery.

Fostering Synergy

Although patients are central to this care model, synergy drives both system and structure schemes. The greatest need of a patient determines the patient's placement. The nurse performs a risk assessment by using the patient's medical information to predict the correct application of established criteria. A postoperative patient who has undergone hip replacement is assigned to a primary nurse whose clinical judgment can best meet the patient's postoperative orthopedic needs. Other specialized members of the healthcare team can more efficiently and effectively collaborate with the patient's varied needs. The intermediate care nurse ensures that the patient's cardiac care and monitoring are appropriate and safe. Both nurses proficiently manage the patient's physical needs with the greatest opportunity to meet the emotional, spiritual, cultural, and social needs of the patient and the patient's family competently.

Matching the needs and characteristics of a particular patient with those of the patient's nurse creates synergy: the cooperative activity of 2 or more agents or persons yields a result that is greater than the combined result would have been if each had worked alone.[12] This professional collaboration within a process structure creates synergy between these nurses and patients.

Unanticipated Benefits

The successes of this thoughtful process have also improved the work environment. The professional process development engaged the team through literature review and performance improvement initiatives and resulted in a stronger clinical team. The AACN has defined 6 standards as essential for establishing and sustaining a healthy work environment: skilled communication, true collaboration, effective decision making, appropriate staffing, meaningful recognition, and authentic leadership.[15]

The hospital leaders challenged the team to create a solution for the telemetry problem. Although unit leaders presented the model foundation, the integration of ideas by the nurses' unit-based shared governance council provided the greatest impetus for improvement. The team resolved the initially unclear communication paths and created insightful communication efficiencies and safer patient care that continue to drive this process. From admission of a patient through the integrated delivery of care to the discontinuation of telemetry, the team developed and revised a matrix of communication paths to ensure success.

Nurses, technicians, and physicians continue to collaborate in a structure that the medical-surgical nurses welcome, and the telemetry nurses gain a greater appreciation for the clinical expertise of the primary nurse specialists. Consistent and appropriate support between the nurses ensures patients' safe care. This true collaborative relationship cultivates trust among practitioners as each healthcare provider recognizes the service offered by the other. The fact that physicians value the nurses' ability to effectively make decisions associated with criteria-based placement of patients, care management, and discontinuation of telemetry has continued to sustain the model. Leadership development and meaningful recognition are ingrained in the daily successes as each practitioner grows to meet the challenges of each unique patient's need by adapting the process. The goal of creating better flow for telemetry patients evolved into better care for these patients and a healthier work environment for all.

Conclusion

A nurse-managed model can result in safe and effective management of patients on remote telemetry when established criteria are used. This project encouraged nurses to look beyond their current practice and environment to create a practice model that is beneficial to patients, the institution, and professional nursing practice. The ultimate goal of expanded telemetry management at our institution was successfully accomplished. The added benefits of supporting an ingrained synergy model and significant staff development created the healthier work environment that is essential for our future.

References

1. American College of Cardiology. Recommended guidelines for in-hospital cardiac monitoring of adults for detection of arrhythmia. Emergency Cardiac Care Committee members. *J Am Coll Cardiol.* 1991;18:1431-1433.
2. Nasraway SA, Cohen IL, Dennis RC, et al. Guidelines on admission and discharge for adult intermediate care units. American College of Critical Care Medicine of the Society of Critical Care Medicine. *Crit Care Med.* 1998;26:607-610.
3. American Association of Critical-Care Nurses. Progressive care fact sheet. Available at: http://www.aacn.org/AACN/pubpolcy.nsf/72fe271374e4c5338825688e00776c20. Accessed March 14, 2007.
4. Olson LA. Welcome to monitor central. *Am J Nurs.* August 2000;100:24AA, 24BB, 24DD.
5. American Association of Critical-Care Nurses. Synergy model for patient care. Available at: www.certcorp.org/certcorp/certcorp.nsf/vwdoc/SynModel?opendocument. Accessed February 9, 2007.
6. Estrada CA, Prasad NK, Rosman HS, Young MJ. Outcomes of patients hospitalized to a telemetry unit. *Am J Cardiol.* 1994;74:357-362.
7. Hollander JE, Valentine SM, McCuskey CF, Brogan GX Jr. Are monitored telemetry beds necessary for patients with nontraumatic chest pain and normal or nonspecific electrocardiograms? *Am J Cardiol.* 1997;79:1110-1111.
8. Durairaj L, Reilly B, Das K, et al. Emergency department admissions to inpatient cardiac telemetry beds: a prospective cohort study of risk stratification and outcomes. *Am J Med.* 2001;110:7-11.
9. Snider A, Papleo M, Beldner S, et al. Is telemetry monitoring necessary in low-risk suspected acute chest pain syndromes? *Chest.* 2002;122:517-523.
10. Billinghurst F, Morgan B, Arthur HM. Patient and nurse-related implications of remote cardiac telemetry. *Clin Nurs Res.* 2003;12:356-370.
11. Curry JP, Hanson CW 3rd, Russell MW, Hanna C, Devine G, Ochroch EA. The use and effectiveness of electrocardiographic telemetry monitoring in a community hospital general care setting. *Anesth Anal.* 2003;97:1483-1487.
12. Curley MA. Patient-nurse synergy: optimizing patients' outcome. *Am J Crit Care.* 1998;7:64-72.
13. Gross PA, Patriaco D, McGuire K, Skurnick J, Teichholz LE. A nurse practitioner intervention model to maximize efficient use of telemetry resources. *Jt Comm J Qual Improv.* 2002;28:566-673.
14. Dawson S, Runk JA. Right patient? Right bed? A question of appropriateness. *AACN Clin Issues.* 2000;11:375-385.
15. American Association of Critical-Care Nurses. AACN standards for establishing and sustaining healthy work environments: a journey to excellence. *Am J Crit Care.* 2005;14:187-197.

CE Test Test ID C073: Fostering Synergy: A Nurse-Managed Remote Telemetry Model

Learning objectives: 1. Identify issues related to development and implementation of a remote telemetry unit in a tertiary care facility 2. Describe the admission and discharge criteria for the remote monitoring units 3. Discuss common causes for patient deterioration and what interventions are most likely to identify those at risk

1. Which of the following best describes remote telemetry?
a. Monitoring of patients at the bedside and at a central nurses' station on the same unit.
b. Monitoring of patients in a central location by personnel who are not directly involved with the patient's care.
c. Monitoring of patients at a central location by the nurses directly providing care.
d. Monitoring of patients in a central remote location by nonlicensed personnel.

2. Which of the following patients is *not* at low risk for development of an arrhythmic event that would require acute intervention?
a. A patient with atypical chest pain
b. A patient with nonspecific electrocardiographic changes
c. A patient with compromised heart failure
d. A patient with ischemic syndrome

3. Which of the following offers the greatest opportunity to rescue compromised patients?
a. Bedside monitoring
b. A nurse's ability to use clinical judgment
c. Regular electrocardiography and radiologic evaluation
d. Regular assessment by a cardiologist or intensivist

4. Which of the following best describes predictability as defined in the American Association of Critical-Care Nurses Synergy Model?
a. A patient characteristic that determines patient resiliency
b. A nurse characteristic that describes how the nurse is able to integrate knowledge
c. A patient characteristic that allows one to expect a certain trajectory of illness
d. A nurse characteristic that describes the overall ability of a nurse to provide care to critically ill patients

5. Given a nurse providing remote telemetry support while caring for her own critically ill patients, which of the following statements is true?
a. The nurses' response to the remote telemetry alarms correlates inversely with his or her individual workload.
b. Experienced nurses with a background in assessing telemetry waveforms do not need extra time to review or respond to alarms.
c. The nurses' response to the remote telemetry alarms correlates directly with his or her workload.
d. None of the above

6. What was the primary objective of the 2 sets of cardiac monitoring criteria?
a. Differentiate patients who meet criteria for remote monitoring versus patients who require an intermediate care admission.
b. Determine which patients have the greatest risk for deterioration.
c. Determine which nurses are best prepared for assuming the monitor nurse role.
d. Differentiate between cardiac versus noncardiac patients.

7. Which of the following patients is *least* likely to be admitted to a remote telemetry unit?
a. 78-year-old man admitted with noncompromised congestive heart failure
b. 66-year-old woman admitted with unstable angina
c. 80-year-old man admitted for pacemaker generator change.
d. 40-year-old woman admitted after uneventful cardioversion

8. Which of the following infusions are considered in the remote telemetry patient?
a. Dopamine at a max of 5 μg/kg/min
b. Nitroglycerine at a max of 75 μg/min
c. Continuous amiodarone infusion
d. No cardiovascular affecting infusions are included in the admission criteria for remote telemetry.

9. Which of the following patients best meets discontinuation criteria for the remote monitoring units?
a. 49-year-old woman admitted with syncope who has been free of dysrhythmia and syncope, without orthostatic changes, for 24 hours
b. 50-year-old woman with diuretic overdose with a potassium of 2.5 and no dysrhythmias
c. 80-year-old man with paroxysmal atrial fibrillation at a rate of 150 bpm; the last episode was 3 hours earlier
d. 60-year-old man with ruled out myocardial infarction, with a troponin level of <0.2 μg/L, and without chest pain

10. Which of the following best describes the monitor nurse assigned to manage the remote telemetry patients?
a. An assigned intensive care unit nurse with only 1 patient to care for
b. An assigned progressive nurse with proficiency in arrhythmia interpretation and advanced cardiac life support
c. The charge nurse on the telemetry unit in conjunction with a trained monitor technician
d. An assigned medical-surgical nurse who has been certified in arrhythmia recognition

11. What was the most common reason for a remotely monitored patient to be transferred to critical care?
a. Neurological deterioration
b. Need for infusion administration
c. Respiratory compromise
d. Physician or family request

12. Which of the following best describes the 2 identified reasons that remote telemetry patients are upgraded to the intermediate care unit?
a. Acuity and staffing levels
b. Patient need for increased monitoring or increased treatments
c. Patient need for infusion administration and physician request
d. Patient need for blood administration and frequent assessments

Test answers: Mark only one box for your answer to each question. You may photocopy this form.

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
❑a	❑a	❑a	❑a	❑a	❑a	❑a	❑a	❑a	❑a	❑a	❑a
❑b	❑b	❑b	❑b	❑b	❑b	❑b	❑b	❑b	❑b	❑b	❑b
❑c	❑c	❑c	❑c	❑c	❑c	❑c	❑c	❑c	❑c	❑c	❑c
❑d	❑d	❑d	❑d	❑d	❑d	❑d	❑d	❑d	❑d	❑d	❑d

Test ID: C073 Form expires: June 1, 2009 Contact hours: 1.0 Fee: $10 Passing score: 9 correct (73%) Category: O Test writer: Kimberly Baxter, RN, MSN, CS-FNP

AMERICAN ASSOCIATION of CRITICAL-CARE NURSES

Mail this entire page to:
AACN
101 Columbia
Aliso Viejo, CA 92656
(800) 899-2226

Program evaluation

	Yes	No
Objective 1 was met	❑	❑
Objective 2 was met	❑	❑
Objective 3 was met	❑	❑
Content was relevant to my nursing practice	❑	❑
My expectations were met	❑	❑
This method of CE is effective for this content	❑	❑

The level of difficulty of this test was: ❑ easy ❑ medium ❑ difficult

To complete this program, it took me _____ hours/minutes.

Name _____ Member # _____
Address _____
City _____ State ____ ZIP _____
Country _____ Phone _____
E-mail _____
RN Lic. 1/St _____ RN Lic. 2/St _____
Payment by: ❑ Visa ❑ M/C ❑ AMEX ❑ Discover ❑ Check
Card # _____ Expiration Date ____
Signature _____

The American Association of Critical-Care Nurses is accredited as a provider of continuing nursing education by the American Nurses Credentialing Center's Commission on Accreditation.

AACN has been approved as a provider of continuing education in nursing by the State Boards of Nursing of Alabama (#ABNP0062), California (#01036), and Louisiana (#ABN12). AACN programming meets the standards for most other states requiring mandatory continuing education credit for relicensure.