ABSTRACT

FINEGAN, M.T. The status of continuous ECG monitoring in phase II cardiac rehabilitation programs. MS in Adult Fitness/Cardiac Rehabilitation, December 1995, 53pp. (P.K. Wilson)

In 1994, Oldridge stated that cardiac rehabilitation is currently in a state of accountability. This study sought to perform an "up to date" evaluation of continuous electrocardiogram monitoring (CECGM) in terms of frequency of use, guidelines for use and termination, cost per monitored session versus discontinuously monitored (DECGM) programs, the need for CECGM, equipment cost, and reimbursement of costs. Responses of 219 randomly selected Phase II programs provided data for analysis. Based on mean values, CECGM programs cost $23.50 more per session per patient than DECGM programs. American Association of Cardiovascular and Pulmonary Rehabilitation guidelines for high risk patients were most often used in determining candidates for CECGM. Clinical stability was most often used for termination of CECGM. In DECGM programs, signs and symptoms were the most frequently used methods of monitoring. The majority of programs using CECGM felt it was essential to ensuring patient safety whereas the majority of DECGM programs did not. A similar trend was seen for psychological dependence on CECGM. Staffing, not CECGM, was found to be the single greatest annual cost to a Phase II program. Medicare was found to be the predominant third party carrier. Private carriers were often used in conjunction with other carriers. Capitation may be a newly developing reimbursement trend. The implications of these findings were discussed.

THE STATUS OF CONTINUOUS ECG MONITORING IN PHASE II CARDIAC REHABILITATION PROGRAMS

A MANUSCRIPT STYLE THESIS PRESENTED

TO

THE GRADUATE FACULTY

UNIVERSITY OF WISCONSIN-LA CROSSE

IN PARTIAL FULFILLMENT

OF THE REQUIREMENTS FOR THE

MASTER OF SCIENCE DEGREE

BY

MARK FINEGAN

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COLLEGE OF HEALTH, PHYSICAL EDUCATION, AND RECREATION
UNIVERSITY OF WISCONSIN-LA CROSSE

THESIS FINAL ORAL DEFENSE FORM

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Master of Science in Adult Fitness/Cardiac Rehabilitation

The candidate has successfully completed his final oral examination.

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TABLE OF CONTENTS

	PAGE
ACKNOWLEDGEMENTS	iii
LIST OF TABLES	vi
LIST OF APPENDICES	vii
INTRODUCTION	1
METHODS	4
SUBJECTS	4
MEASUREMENTS	5
RESULTS	6
THE SAMPLED PROGRAMS	6
CONTINUOUS ECG MONITORED PROGRAMS	7
DISCONTINUOUSLY MONITORED PROGRAMS	9
COST	10
REIMBURSEMENT	12
DISCUSSION OF RESULTS	15
CONCLUSION	20
REFERENCES	23
APPENDICES	26

LIST OF TABLES

TABLE		PAGE
1.	Criteria for determining the use of continuous ECG monitoring	8
2.	Termination criteria for continuous ECG monitoring	9
3.	Prevalence of monitoring methods in programs utilizing discontinuous ECG monitoring	10
4.	Percent usage of various brands of telemetry equipment	11
5.	Percentages of public third party carriers found in responding programs	13
6.	Percentage of patients covered by public third party cariers	13
7.	Percentage of public third party carriers' coverage by the number of Phase II sessions	14
8.	Percentage of public third party carriers' coverage by monitoring method	14

LIST OF APPENDICES

APPENDIX	PAGE
A. Sample Cover Letter for the Initial Questionnaire Mailing	26
B. Sample Questionnaire	28
C. Sample Cover Letter for the Follow-up Questionnaire Mailing	35
D. Review of Related Literature	37

Introduction

The absence of a viable and feasible national health care program has brought to light the debate as to what is essential and efficable with regards to the current availability of medical and rehabilitation services. Of particular interest has been the lack of a uniform approach to the role of continuous ECG monitoring (CECGM) for Phase II patients of cardiac rehabilitation programs.[1] Issues including frequency of use, guidelines for use and termination, necessity, cost per session, equipment costs, and reimbursement of CECGM become paramount topics for debate when evaluating this aspect of a Phase II program. Given the scarcity of health care resources, cardiac rehabilitation must be evaluated on the basis of economics as it relates to other rehabilitation measures.

In 1994, Morris indicated that exercise in the prevention of coronary heart disease is the "best buy" in public health.[2] Exercise of this nature must be monitored to insure patient safety. The results of this study may be influential with regards to the structuring of current and future cardiac rehabilitation programs in terms of what may be added to studies of cost utility analysis and economic efficiency.

It is generally recommended that high risk patients benefit from CECGM.[3] Several criteria currently exist in identifying candidates for CECGM. The American Association of Cardiovascular and Pulmonary Rehabilitation (AACVPR),[4] American College of Sports Medicine (ACSM),[5] and the American College of Cardiology[6] all provide criteria for describing high risk patients which closely mirror each other.

The adoption of CECGM has been made by several cardiac rehabilitation programs in an attempt to minimize the risk of acute myocardial infarction.[7] Several studies have found that CECGM is a valuable component of cardiac rehabilitation.[7-11] Many of these studies relate the occurrence of serious dysrhythmias to patient hours.[8-10] One study indicated that in a monitored situation, a serious dysrhythmia occurred in 1 of 117,333 patient hours compared to a ratio of 1 dysrhythmia for every 22,028 patient hours in an unmonitored situation.[9] It has also been indicated that as many as 67% of patients are absent of symptoms at the time of dysrhythmia detection,[11] thus reinforcing the rationale for utilizing CECGM.

Although there appears to be substantial evidence demonstrating the value of CECGM, evidence also exists favoring DECGM. Haskell stated in 1994 that there appears to be a deficiency in the amount of scientific documentation when determining if continuous monitoring increases patient safety.[7] In 1986, Van Camp and Peterson found no significant

difference in the cardiac arrest rates of programs utilizing continuous versus discontinuous monitoring.[12] Measures such as changes in heart rate, blood pressure, or symptoms have been deemed better indicators of cardiac events in patients requiring medical intervention.[1]

There also appears to be an indication that a psychological dependence on CECGM may develop. The ACSM guidelines indicate that patients should be gradually taken off continuous monitoring, instead relying on "quick looks", blood pressure monitoring, and ratings of perceived exertion (RPE).[5]

Cost is undoubtedly a major source of conflict in Phase II programs. In 1988, Byl, Reed, Franklin, and Gordon stated that CECGM is the major financial burden supported by a rehabilitation setting.[13] In 1991, it was determined in one study that cost of equipment comprised nearly 63% ($420) of the cost per patient ($670) for an 8 week Phase II program.[14] The Quinton Company indicated in 1994 that telemetry equipment may cost as little as $14,550. Also in 1994, an exercise physiologist indicated that telemetry equipment may cost up to $40,000.

Reimbursement of the cost of a cardiac rehabilitation program may be either public (Medicare, Medicaid, the Bureau of Vocational Rehabilitation, Worker's Compensation for Medical Care, and Civilian Health and Medical Programs of Uniform Services) or private (Blue Cross/Blue Shield).

These parties have an obligation to deter the rising costs of quality care of which cardiac rehabilitation should be a part.[3] In 1993, Hall indicated that of total health costs ($600 billion), 32% ($192 billion) was covered by private carriers compared to public factions like Medicare and Medicaid which covered 17% ($106 billion) and 10% ($60 billion), respectively.[3] Recently, the total cost of cardiovascular disease in the United States was estimated to be $135 billion.[15]

At the 1994 Wisconsin Cardiovascular and Pulmonary Rehabilitation annual meeting, Worel stated that capitation, the process by which a set amount of money is allotted per covered life, is a recently developing insurance trend which warrants investigation. This money may be applied to rehabilitation services as is deemed necessary.

Methods

Subjects

A cover letter (see Appendix A) and questionnaire (see Appendix B) were sent to 463 randomly chosen cardiac rehabilitation programs containing Phase II components across the United States. Programs were selected from the *AACVPR Programs Directory*[16] by a lottery process. A follow-up mailing including a separate cover letter (see Appendix C) and questionnaire was conducted to increase the total response rate. A large sample size was deemed essential if

the questionnaire was to be representative of the sampled population.

Measurements

The sampled program. Location, size, duration, and frequency of the various Phase II programs were measured in an attempt to typify the sampled population.

Continuous versus discontinuous programs. The prevalence of CECGM utilization was measured. Programs using CECGM were evaluated on cost per session, criteria for determining the use and termination of CECGM, psychological dependence, and whether CECGM is essential for the safety of cardiac rehabilitation. Programs utilizing DECGM were measured on the variables of cost per session, monitoring methods, psychological dependence of CECGM, and whether CECGM is essential for the safety of cardiac rehabilitation.

Equipment and supply costs. Evaluation of specific telemetry units was based on frequency of use, average cost, average age of the telemetry units, and monitoring capacity. The average cost of telemetry supplies as well as the greatest contributing financial burden (equipment, supplies, staffing, or other) to Phase II programs were also evaluated.

Reimbursement. Questions concerning reimbursement were divided into public, private, and capitation areas. Percentages of patients receiving various forms of public reimbursement and private reimbursement were evaluated as well as what coverage was provided by each service (number of

Phase II sessions, CECGM, and DECGM). Programs were asked if any reimbursement was provided through capitation and the approximate amount.

Results

The Sampled Programs

Two hundred nineteen of the 463 surveyed programs responded representing a return rate of 47.3%. In this sample of 219 Phase II cardiac rehabilitation programs, 79% were located in hospitals, 7.8% in clinics, 11.8% were free standing, and 1.4% indicated their location as "other" including a Boy's Club Gym, YMCA, a university setting, and a separate building on hospital grounds. Of those indicating hospital based operation (n = 173), the average number of beds was 307.8 with an interquartile range value (Q) of 260. This was based on a total of 118 responses to this question.

Sampled Phase II programs averaged 127.6 (Q = 100) patients annually (n = 194 responses) which accounted for an average of 42.5% (Q = 36%) of the total patient population for all cardiac rehabilitation services across Phases I to IV.

Seventy six percent of Phase II programs lasted 8-12 weeks, 18.8% lasted between 4-8 weeks, 4.8% lasted between 1-4 weeks, and 1.3% indicated program duration as "other". These included 3-12 weeks, 12-18 weeks, and 6-8 weeks. Nearly 95% of the programs met three times per week, 3.2% met

twice a week, and 0.9% met either once or four times per week.

Nearly all (94.5%) (n = 207) of Phase II programs indicated that they used CECGM whereas 8.7% (n = 19) used DECGM. Seven programs indicated the use of both methods in their programs.

Continuous ECG Monitored Programs

In programs using CECGM (n = 207), the average cost per session was $69.53 (Q = $27.00) per session. In determining candidates for CECGM, all responses of those programs utilizing CECGM were analyzed. Among risk stratification criteria, AACVPR guidelines were used by 60.4% of respondents, ACSM guidelines were used in 35.8% of programs, ACC guidelines were used by 23.7% of respondents, and AHA guidelines were used 23.2% of the time. Reimbursement criteria were used by 57.0% of respondents. In 14.9% of the responses, all patients were continuously monitored through the entire Phase II program regardless of criteria, 4.4% utilized physician orders, and only 1.5% of programs had variable monitoring qualifications allowing for patients to be weened off of monitoring. Generally, programs did not rely exclusively on any one criteria. Table 1 summarizes the guidelines for determining the use of continuous ECG monitoring.

Table 1. Criteria for determining the use of continuous ECG monitoring*

Criteria	n	Percent
Risk Stratification		
AACVPR	125	60.4
ACSM	74	35.8
ACC	49	23.7
AHA	48	23.2
Reimbursement	119	57.0
Always Monitored	31	14.9
Physician Orders	9	4.4
Variable	3	1.5

*n is based on 207 of 219 responses received

The breakdown of termination criteria for CECGM in responding programs (n = 207) follows. Clinical stability was used by 61.8% of respondents, staff decision was used 44.9% of the time, the patient's ability to self-monitor pulse was used 15.9% of the time, 11.6% of programs used discharge from the Phase II program as a termination point, and 6.3% utilized reimbursement criteria of third party insurers. These findings are summarized in Table 2.

Table 2. Termination criteria for continuous ECG monitoring*

Criteria	n	Percent
Clinical Stability	128	61.8
Staff Decision	93	44.9
Self-Monitoring (pulse)	33	15.9
Discharge From Phase II	24	11.6
Reimbursement Criteria	13	6.3

*n is based on 207 of 219 responses received

Only 33.2% of those using CECGM (n = 207) felt that it created a psychological dependence. Just over 68% indicated that CECGM was essential to ensuring the safety and effectiveness of cardiac rehabilitation programs.

Discontinuously Monitored Programs

The average cost of a DECGM program provided by responding programs (n = 19) was $46.03 (Q = $39.80). Signs and symptoms were the most frequently used method of monitoring (47.4%) followed by "quick looks" (26.3%), periodic telemetry (21.0%), and "other" forms of monitoring (5.3%) including pulse oximeters, heart rate monitors, and 12 lead EKGs. These findings are summarized in Table 3.

In those programs utilizing DECGM (n = 19), 66.7% indicated that they felt continuous monitoring may result in a psychological dependence. Of these programs, 72.2% did not

feel that CECGM was essential to ensuring the safety and effectiveness of cardiac rehabilitation programs.

Table 3. Prevalence of monitoring methods in programs utilizing discontinuous ECG monitoring*

Monitoring Method	n	Percent
Signs and symptoms	9	47.4
Quick looks	5	26.3
Periodic telemetry	4	21.0
Other	1	5.3

*n is based on 19 of 219 responses received

Cost

Table 4 summarizes which brands of telemetry units were used by what percentange of programs. The average cost of a telemetry unit regardless of equipment brand was $32,215.30 (n = 156) (Q = $23,000). The average age of the equipment in responding programs (n = 206) was 5.4 years old (Q = 7.0). It was also determined that responding programs (n = 219) possessed the ability to monitor 7.4 (Q = 4) patients at one time.

Table 4. Percent usage of various brands of telemetry equipment

Brand	n	Percent
Quinton	65	29.7
Hewlett Packard	34	15.5
Nihon Khoden	21	9.6
Spacelabs	20	9.1
Scott Care	15	6.9
Eaton	10	4.6
Marcom	9	4.1
Marquette	6	2.7
Accucore	6	2.7
Transkinetics	5	2.3
Fukada Denshi	4	1.8
Life Sense	4	1.8
Mennen	3	1.4
Escort	3	1.4
Dynamic Options	3	1.4
Physio Control	3	1.4
Siemans	2	.9
Other	6	2.7
Total	219	100.0

The average annual cost of telemetry supplies was $2,689.06 (Q = $2,200) (n = 153). Telemetry supplies were defined as batteries, electrodes, and other items.

Phase II programs (n = 219) overwhelmingly indicated that the single greatest annual cost was staffing (95.8%) followed by telemetry equipment (2.3%), supplies (.9%), and "other" factors (.9%).

Reimbursement

Of the 219 respondents, Medicare (MC) was used in 94.5% of Phase II programs, Medicaid (MD) in 47.0%, the Bureau of Vocational Rehabilitation (BVR) in 15.5%, Worker's Compensation (WC) in 16.9%, and CHAMPUS in 5.0%. With regards to what percentage of patients in Phase II programs was covered by the aforementioned programs, respondents indicated that 63.9% (Q = 27%) of patients received coverage from MC, 6.2% (Q = 9%) from MD, 4.1% (Q = 4%) from BVR, 2.8% (Q = 1.5%) from WC, and 3.1% (Q = 4%) from CHAMPUS. Tables 5 and 6 represent the above data.

Table 7 summarizes what each public reimbursement program covers with regards to the number of monitoring sessions while Table 8 summarizes coverage based on CECGM and DECGM services.

Table 5. Percentages of public third party carriers found in responding programs*

Third Party Carrier	n	Percent
Medicare	207	94.5
Medicaid	103	47.0
Bureau of Vocational Rehabilitation	34	15.5
Worker's Compensation	37	16.9
CHAMPUS	11	5.0

*n is based on 219 responses

Table 6. Percentage of patients covered by public third party carriers*

Third Party Carrier	Percent	Q Value
Medicare	63.9	27.0
Medicaid	6.2	9.0
Bureau of Vocational Rehabilitation	4.1	4.0
Worker's Compensation	2.8	1.5
CHAMPUS	3.1	4.0

*n is based on 219 responses

Table 7. Percentage of public third party carriers' coverage by the number of Phase II sessions*

Feature	MC	MD	BVR	WC	CHAMPUS
n	218	99	33	39	79
1-12	4.6	3.0	6.1	7.7	12.7
13-24	3.2	6.1	6.1	5.1	6.3
25-36	92.2	90.9	87.9	87.2	81.0

*n is based on 219 responses

Table 8. Percentage of public third party carriers' coverage by monitoring method*

Feature	MC	MD	BVR	WC	CHAMPUS
n	218	105	32	39	77
Con. ECG	94.5	90.9	97.0	82.1	91.1
Discon.	15.6	9.1	36.4	20.5	11.4
Both	14.7	11.1	36.4	15.4	11.4
Neither	4.6	7.1	3.0	12.8	8.9

*n is based on 219 responses

In programs responding to the question of what percentage of patients are covered by private insurance companies and HMOs (n = 205) it was found that an average of 35.4% (Q = 30%) of patients fell into this category. No

breakdown of what the companies were or what was covered by each company was determined.

One hundred ninety four programs responded to the question concerning the availability of capitation. Only 17% (n = 33) of responding programs indicated that capitation was used. Of the 17%, only 69.6% (n = 23) provided information on the amount provided. Just over 26% indicated that the amount ranged from $10,000 to $20,000, 13% indicated that the amount ranged from $40,000 to $50,000, and 60.9% indicated that the amount was $5,000 or less.

Discussion of Results

The purpose of this study was to evaluate CECGM on the basis of several variables. Several important findings warrant discussion.

Overall findings of this study indicate a conflict exists when examining the use of CECGM versus DECGM. An overwhelming majority (94.5%) of programs indicated that they use CECGM compared to only 8.7% of programs which used forms of DECGM. Although the survey did not provide a specific question as to why one form was used in preference to another, other responses may provide insight into various areas of controversy.

First, facility policy may influence decision making. Nearly 15% of responding programs continuously monitored patients throughout the Phase II program regardless of risk stratification criteria. One respondent indicated that this

was done to avoid malpractice litigation. Many programs that monitor patients throughout the Phase II program may have gone undetected because this option was not provided on the questionnaire. Whether or not this practice continues remains to be seen. Financial cutbacks and downsizing in rehabilitation settings may become necessary, thereby making CECGM available only to high risk patients. This reinforces the statement that this population benefits from CECGM.[3] In the event that an exclusive use policy such as this emerges, a greater dependence on DECGM methods for lower risk patients could develop. Based upon data from those programs utilizing DECGM, signs and symptoms may emerge as the primary method of monitoring (see Table 3).

Second, the cost differential per session is apparent when examining both monitored situations. The average cost for a CECGM program was $69.53 where the average cost for a DECGM program was $46.03. These findings may be influential when establishing price criteria for Phase II programs. It should be noted that there were large ranges of values for both cost figures. Consequently, the interquartile range value was used as a measure of variability. Continuous ECG values ranged from $4.50 to $157, and DECGM values ranged from $9.40 to $111. The wide range of DECGM figures may be attributed to the possibility that some values given applied to Phase III, not Phase II programs. In addition, while a large sample size (n = 207) existed for CECGM programs, there

was a small sample of DECGM programs (n = 19). It may be concluded that more homogeneous samples for both types of programs and a larger sample size for DECGM programs would increase the validity of both cost figures.

Third, it is important to note that 68% of those utilizing CECGM deemed it essential for insuring the safety of a cardiac rehabilitation program as compared to only 27.8% of programs where discontinuous monitoring was predominant. Clearly, a bias exists based on whether continuous monitoring is used or not. A similar pattern was seen when examining opinions on the psychological dependence incurred by the use of CECGM.

There appears to be no one criteria for determining the use and termination of CECGM. The most prevalent criteria for the use of continuous monitoring was found to be the AACVPR guidelines for high risk individuals. Over 60% of responding programs utilized these criteria. However, in the majority of cases, many criteria were used as adjuncts to each other. Of particular interest was the percentage of programs following reimbursement criteria (57%). A reliance on reimbursement criteria could deny needy patients necessary monitoring services based on third party coverage. One program avoided this by establishing "scholarships" for those patients who were unable to pay for monitoring.

A similar trend was seen in termination criteria for CECGM (see Table 2). Clinical stability was utilized most

often (61.8%), but there was seldom one criteria selected, implying that patient safety is the paramount concern.

There is apparently no perfect guide to insuring patient safety. Many times, several elements of various risk stratification guidelines were combined with other criteria (i.e., reimbursement). It was also common to combine a variety of termination criteria. These results, combined with the finding that 68% of programs utilizing CECGM felt it essential, refute to some extent, Haskell's statement that a lack of scientific evidence exists in determining if CECGM increases patient safety.[9]

Findings of this study indicate that for the majority of responding programs (n = 219), staffing, not monitoring, was the greatest cost incurred in a Phase II program. Almost 96% of the programs indicated staffing was the biggest financial burden to a Phase II program. Only 2.3% felt that telementry equipment represented the greatest cost, thus refuting Byl et al's. statement that the major burden was CECGM.[13] The average cost for telemetry equipment was found to be $32,215.30 whereas the average annual cost for telemetry supplies was $2,689.06. The average telemetry unit was 5.4 years old and capable of monitoring 7.4 patients at any given time. Regardless of whether or not the telemetry unit is paid off over time, it is clear that monitoring is not the single greatest cost in a cardiac rehabilitation program.

It appears that Medicare and Medicaid are the principal third party carriers of patients needing monitoring services. Medicare was found in 94.5% of responding programs and covered an average of 63.9% of patients. Medicaid was seen in 47% of responding programs but covered only 6.2% of patients. Tables 5 and 6 provide a complete picture of how public third party carriers relate to each other in terms of the percentage of programs where the carriers are present and the percentage of patients covered by the carriers. In all cases, more than one carrier was used in the Phase II program. Public third party coverage was often supplemented with some form of private insurance which was used by an average of 35.4% of patients. Given the uncertain status of Medicare in the United States, many patients may not be able receive proper coverage should cutbacks occur. As a result an increased reliance on alternate public or private third party carriers may be seen. One problem with this scenario is that many individuals may not be eligible for services such as CHAMPUS, a service for armed forces personnel and their families.

Tables 7 and 8 summarize findings concerning what public third party carriers will cover. All public third party carriers provided the greatest coverage for 25-36 sessions and CECGM. Discontinuous ECG monitoring was also covered to a lesser extent by all carriers. It was also found that many carriers provided coverage for both forms of monitoring and

in a small percentage of cases, public carriers covered neither form of monitoring. Again, should portions of federally funded programs like Medicare be cut, patients may not be provided with funds to cover sufficient monitoring sessions or methods of monitoring and thus compromise safety.

Capitation, while found in only 17% of responding programs, does appear to be an emerging form of reimbursement. Several programs indicated that while not currently dealing with patients receiving capitated funds they were beginning to see an increased incidence of those belonging to this population. Currently, it appears that the majority of those receiving capitated funds receive less than $5,000 toward monitoring and Phase II programs.

Conclusion

The majority of surveyed Phase II programs (79%) are located in hospitals predisposing them to downsizing and cutbacks. On the average, Phase II programs were found to comprise 42.5% of the total patient population for all cardiac rehabilitation services across Phases I to IV. This may be attributed to a high volume of Phase I patients in hospital settings.

Nearly all respondents utilized CECGM regardless of risk stratification, reimbursement criteria, or otherwise. Criteria for termination of CECGM vary with clinical stability being the most prevalent.

A conflict does appear to exist between CECGM and DECGM. Elements of this include cost differential, monitoring methods as a function of safety, and psychological dependence. Despite some indications, staffing, not CECGM was found to be the single greatest cost of a Phase II program.

With regards to reimbursement, Medicare was the most utilized public third party carrier. Public reimbursement carriers were often used as adjuncts or were often supplemented with a private carrier. All public carriers covered 25-36 sessions and CECGM more than any other service. Capitation, while not a predominant form of insurance coverage, does appear to be coming onto the insurance scene.

Modifications in the questionnaire and continued research in several areas are needed. First, when determining location of Phase II programs, it should be determined what percentage of programs not located in hospitals are in fact hospital based. Second, the percentage of programs using both CECGM and DECGM for Phase II should be determined. Third, the reason for using CECGM versus DCGM should be determined. Fourth, "supplies" for telemetry equipment need to be more clearly defined. A larger sample size, particularly for programs not using CECGM would be beneficial. Issues not addressed by this study that require further investigation include the frequency of dysrhythmias missed were CECGM not used and what percentage of monitoring

is covered by a third party carrier compared to what percent is covered by the patient. These recommendations may add to the decision making process when determining if CEC should be used.

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APPENDIX A

SAMPLE COVER LETTER FOR THE INITIAL QUESTIONNAIRE MAILING

Date

Program Director/Title
Institution Name
Street Address
City, State Zip Code

Dear :

My name is Mark Finegan and I am a graduate student in the Adult Fitness/Cardiac Rehabilitation M.S. Program at the University of Wisconsin-La Crosse.

In partial fulfillment of my master's degree, I am required to complete a thesis. The title of my thesis is "The Status of Continuous ECG Monitoring in Phase II Cardiac Rehabilitation Programs." Specific areas to be examined include the rationale for utilizing continuous versus discontinuous ECG monitoring, the cost of continuous ECG monitoring, and the reimbursement of continuous ECG monitoring.

Your program was chosen, (by random selection), from the AACVPR program directory. Your response, in addition to those of other programs which I am soliciting, will increase the validity of the results. I would appreciate your time and effort in responding to this questionnaire. A self-addressed envelope is enclosed for your convenience. Accordingly, please respond no later than April 10th. Those programs responding to the questionnaire will receive a copy of the results. All responses will remain confidential.

Thank you for your time and consideration.

Sincerely,

Mark Finegan

cc: Mr. Al DiLuzio, Executive Director, Wisconsin Heart Institute
Dr. Phil Wilson, Thesis Chairman, University of Wisconsin-La Crosse

APPENDIX B

SAMPLE QUESTIONNAIRE

The Status of Continuous ECG Monitoring in Phase II Cardiac Rehabilitation Programs

Program Title: _____

Clinic/Hospital: _____

Program Director: _____
(Last Name) (First Name)

Address: _____
(Street)

_____
(City) (State) (Zip Code)

Phone Number (work): _____

Fax Number (work): _____

For the following questions, please check the appropriate answer blank where required.

GENERAL INFORMATION:

1. Please indicate the location of your phase II program.
   a. Hospital _____ Number of beds _____
   b. Clinic _____
   c. Free standing _____
   d. Other _____

   If you indicated "other", please indicate the location.

   _____

2. How many patients participate annually in the following programs?

		NA
a. Phase I (inpatient)	_____	_____
b. Phase II (immediate outpatient)	_____	_____
c. Phase III (intermediate outpatient, no continuous or intermittent ECG monitoring)	_____	_____
d. Phase IV (maintenance outpatient)	_____	_____

3. What is the average duration (weeks) of the phase II program for a typical patient?

   a. 1-4 _____
   b. 4-8 _____
   c. 8-12 _____
   d. other _____ Number of weeks: _____

4. On the average, how many times per week does each patient meet for the phase II program?
   1 _____ 2 _____ 3 _____ 4 _____ 5 _____

CONTINUOUS VERSUS DISCONTINUOUS ECG MONITORING:

5. Do you use continuous ECG monitoring during phase II?
yes___ no___

If you answered yes, proceed to questions 6-10.
If you answered no, proceed to questions 11-14.

CONTINUOUS MONITORING:

6. What is the average cost per session for each participant? _____

7. Which of the following do you use in determining which patients receive continuous ECG monitoring? (Please check all that apply.)

a. Risk stratification
   1) American Association of Cardiovascular and Pulmonary Rehabilitation guidelines _____
   2) American College of Sports Medicine guidelines _____
   3) American College of Cardiology guidelines _____
   4) American Heart Association guidelines _____
b. Reimbursement criteria _____
c. Other (if other, please elaborate below) _____

Please elaborate:_____

_____

_____

8. Which of the following serve as termination criteria for continuous ECG monitoring?

a. The participant can monitor his/her pulse _____
b. Staff decision _____
c. Clinical stability _____
d. Other (if other, please elaborate below) _____

Please elaborate:_____

_____

9. In your opinion, does continuous monitoring create a psychological dependence? (please check) yes___ no___

10. In your opinion, is continuous monitoring essential for cardiac rehabilitation programs to be safe and effective?
yes___ no___

*** Proceed to question 15.**

DISCONTINUOUS MONITORING:

11. What is the average cost per session for each participant? _____

12. For monitoring purposes, do you use any of the following?

    a. Quick Looks _____
    b. Periodic Telemetry _____
    c. Signs and Symptoms _____
    d. Other (if other, please elaborate below) _____

    Please elaborate: _____

    _____

13. In your opinion, does continuous monitoring create a psychological dependence? yes___ no___

14. In your opinion, is continuous monitoring essential for cardiac rehabilitation programs to be safe and effective? yes___ no___

    *** Proceed to question 15.**

COST:

15. What brand(s) of telemetry equipment do you use?

    a. Burdick _____
    b. Eaton _____
    c. Marquette _____
    d. Quinton _____
    e. Scott Care _____
    f. Other (if other, please elaborate below) _____

    Please elaborate: _____

    _____

16. What year did you purchase the equipment? _____

17. What was the cost of the telemetry unit? _____

18. How many participants are you able to monitor at one time? _____

19. What is the estimated annual cost of supplies (electrodes, batteries, etc.)? _____

    If other supply costs exist, please elaborate below.

    _____

    _____

20. Which of the following contributes most to the annual cost of a phase II cardiac rehabilitation program?

a. Telemetry equipment _____
b. Supplies _____
c. Staffing _____
d. Other (If other, please elaborate below) _____

Please elaborate: _____

_____

FEDERAL REIMBURSEMENT PROGRAMS:

21. Do participants receive third party reimbursement through any of the following (check all that apply)?

a. Medicare (MC) _____
b. Medicaid (MD) _____
c. Bureau of Vocational Rehabilitation (BVR) _____
d. Workers Compensation for Medical Care (WC) _____
e. Civil Health and Medical Programs of Uniform Services (CHAMPUS) _____
f. Other (if other, please elaborate below) _____

Please elaborate: _____

_____

_____

22. Please indicate what percentage of patients are covered by the following.

a. Medicare (MC) _____
b. Medicaid (MD) _____
c. Bureau of Vocational Rehabilitation (BVR) _____
d. Workers Compensation for Medical Care (WC) _____
e. Civil Health and Medical Programs of Uniform Services (CHAMPUS) _____
f. Other (if other, please elaborate below) _____

Please elaborate: _____

_____

_____

23. On the following table, please check which is covered by the above organizations.

Organization Service	MC	MD	BVR	WC	CHAMPUS	Other
1-12 sessions	___	___	___	___	___	_____
13-24 sessions	___	___	___	___	___	_____
25-36 sessions	___	___	___	___	___	_____
Continuous Monitoring	___	___	___	___	___	_____
Discontinuous Monitoring	___	___	___	___	___	_____

PRIVATE REIMBURSEMENT:

24. What percentage of participants receive private (i.e. Blue Cross/Blue Shield etc.) reimbursement? _____

25. In the following table, please list any private companies and check which of the services they cover.

Service Organization:	1-12 sessions	13-24 sessions	25-36 sessions	Contin. ECG	Discon. ECG
_____	___	___	___	___	___
_____	___	___	___	___	___
_____	___	___	___	___	___
_____	___	___	___	___	___
_____	___	___	___	___	___
_____	___	___	___	___	___

26. Please indicate what percentage of patients are covered by the above companies?

Company:	Percent:
_____	_____
_____	_____
_____	_____
_____	_____

27. Do any participants receive reimbursement through capitation? yes___ no___

28. If you answered yes, what is the approximate amount provided for rehabilitation?

a. $10,000 - 20,000 _____
b. $20,000 - 30,000 _____
c. $30,000 - 40,000 _____
d. $40,000 - 50,000 _____
e. Other (if other, please elaborate below) _____

Please elaborate:_____

29. Your program was chosen from the AACVPR Program Directory. Do you feel there are any advantages to having your program published in the directory?

_____

_____

_____

_____

If you have any questions or concerns, I may be reached at:
(608) 784-3587

Mark Finegan
University of Wisconsin-La Crosse
221 Mitchell Hall
La Crosse, WI 54601

Thank you for your time and effort in filling out this questionnaire.

APPENDIX C

SAMPLE COVER LETTER FOR THE FOLLOW-UP QUESTIONNAIRE MAILING

Date

Program Director/Title
Institution Name
Street Address
City, State Zip Code

Dear :

My name is Mark Finegan and I am writing in regards to the questionnaire I mailed to you March 27th. As you remember my thesis is "The Status of Continuos ECG Monitoring in Phase II Cardiac Rehabilitation Programs." I have yet to receive your completed questionnaire. In case you have misplaced the questionnaire, I have enclosed an additional copy along with a self-addressed stamped envelope. I would appreciate your prompt response and return of the enclosed survey by May 1st. Again, thank you for your time and effort. If you have any questions or concerns, I can be reached at (608) 784-3587.

Sincerely,

Mark Finegan

APPENDIX D

REVIEW OF RELATED LITERATURE

REVIEW OF RELATED LITERATURE

Introduction

The absence of a viable and feasible national health care program has brought to light the debate as to what is essential and efficable, financial or otherwise, with regards to the current availability of medical and rehabilitation services given the scarcity of health care resources. Of particular interest has been the lack of a uniform approach to the role of continuous ECG monitoring for Phase II patients of cardiac rehabilitation programs.[1] Issues including beneficiaries, need, cost, and reimbursement of continuous monitoring become paramount topics for debate when evaluating this single aspect of a Phase II program. Options such as "quick looks", periodic rhythm strips, and periodic telemetry, add to the question of whether continuous monitoring is a relevant procedure.[2] There exists a need for an "up to date" study to evaluate and determine the status of continuous monitoring on a national level in terms of the aforementioned subtopics. Oldridge stated at the 1994 annual Wisconsin Cardiopulmonary Rehabilitation meeting that cardiac rehabilitation is currently in a state of assessment and accountability. It is this state that reinforces the relevancy of this study. Given the scarcity of health care resources, cardiac rehabilitation must be evaluated on the

basis of economics as it relates to other rehabilitation measures. Recently, Morris has indicated that exercise in the prevention of coronary heart disease is the "best buy" in public health.[3] Exercise of this nature must be monitored to insure patient safety. The results of this study may be influential with regards to the structuring of current and future cardiac rehabilitation programs in terms of what it may add to studies of cost utility analysis and economic efficiency.

Phase II Programs

Necessity

Phase II implies the first outpatient period following the patient's hospital stay.[4] According to the American Association of Cardiovascular and Pulmonary Rehabilitation (AACVPR) *Guidelines for Cardiac Rehabilitation Programs*, the length of this phase is determined by risk stratification and monitoring needs.[4] In any case this is the most closely monitored phase. Some researchers believe monitoring must be made available because exercise in a cardiac rehabilitation setting qualifies as a medical procedure.[5] This view is supported by a study indicating that 87% of physicians surveyed said continuous monitoring was essential for a cardiac rehabilitation program to be safe and effective.[6] In short, the presence of continuous monitoring seems to ensure patient safety.

Duration. Although evidence exists indicating that the duration for a Phase II program need only last 4 weeks,[7] standard Phase II programs meet a minimum of 7 but preferably for 12 weeks.[8] The AACVPR recommends that Phase II programs last 12 weeks but recognizes that this may change according to managed care models, contracts with payers, and treatment protocol designs.[4] Benefits of Phase II programs are both financial and physical. Financial benefits include decreased rehospitalization cost, increased return to work, and decreased outpatient medical costs.[9] Physical benefits include increased functional capacity and cardiac function, decreased cardiac symptoms, an improved quality of life, and increased longevity.[9]

Association Recommendations

Criteria for Beneficiaries

In 1991, it was estimated that only 20% of the patients eligible for cardiac rehabilitation took part in a program.[10] Oldridge stated in 1994 that there are currently one million people eligible for cardiac rehabilitation services. Given these two conditions, it may be concluded that a significant number of patients are not receiving necessary rehabilitation services. With regards to identifying the beneficiaries of continuous monitoring, several criteria currently exist. In 1986, the American College of Cardiology identified several criteria for eligible candidates for continuous monitoring.

These included, but were not limited to, severely depressed left ventricular function, complex ventricular arrhythmias at rest and/or exercise, and exercise induced ischemia signified by depression of the ST segment.[11] These guidelines closely reflect those of the American College of Sports Medicine (ACSM) for high risk patients.[12] The ACSM describes a high risk patient as one who has:

1. Severely depressed left ventricular function (EF<30%).
2. Resting complex ventricular dysrhythmias (Lown grade IV or V).
3. PVC's increasing or appearing with exercise.
4. Exertional hypotension (≥ 15 mm Hg).
5. A recent myocardial infarction (<6 months) complicated by serious ventricular dysrhythmias.
6. Exercise-induced ischemia of >2 mm ST.
7. Survived a cardiac arrest.

The 1995 AACVPR guidelines indicate that staff should use continuous monitoring for patients unless the patient is clinically stable and exercise prescription is appropriately conservative, in which case a staff decision must be made to use frequent intermittent monitoring.[4] Forms of intermittent monitoring include "quick looks", periodic rhythm strips, and periodic telemetry monitoring.[4]

Who benefits

It is generally recommended that high risk patients benefit from continuous monitoring.[13] These patients should be under constant watch and receive a conservative exercise prescription.[4] This position is reaffirmed in the AACVPR's

Guidelines for Cardiac Rehabilitation Programs which state that intensive monitoring should be used unless the patient demonstrates no abnormal responses to exercise or any other abnormal signs and symptoms.[14] Recently these guidelines were used to determine if those at risk for coronary artery disease varied across low, moderate, and high risk categories from 1988 to 1994 at the Heart Institute of the Greenville Hospital System Heartlife Program.[15] They concluded that of 1395 patients, 66% were at low risk, 12% were at moderate risk, and 22% were at high risk. They also concluded that 85 to 90% of patients were either moderate or high risk.

The Need for Continuous Monitoring

The adoption of continuous monitoring has been made by several cardiac rehabilitation programs in an attempt to minimize the risk of acute myocardial infarction, coronary artery surgery, and angioplasty.[16] Through continuous monitoring, detection of any detrimental cardiac event could result in immediate treatment of the patient.

In a 12 week study, 44% of the subjects studied exhibited a serious dysrhythmia (PVC > 5 per minute, ventricular bigeminy or trigeminy, ventricular tachycardia, and coupling) during the first 7 weeks. These subjects were exercising at 75 to 85% of an attained maximal exercise heart rate. In addition, 14.5% of the subjects exhibited a serious dysrhythmia during weeks 8 to 12.[8] Further evidence for the necessity of continuous monitoring was found when Haskell

reported that in a monitored situation, a serious dysrhythmia occurred in 1 of 117,333 patient hours whereas in a nonmonitored situation, a serious dysrhythmia was noted in 1 of 22,028 patient hours.[17] Other studies have found that cardiac arrests occur in 1 of 112,472 patient hours, myocardial infarction occurs in 1 of 295,240 patient hours, and a fatality occurs in 1 of every 787,305 patient hours.[18] It should be noted that this study also concluded that the cardiac arrest rate was not significantly different in programs using continuous monitoring versus those using discontinuous monitoring. The question is, "Should statistical significance be placed before responsibility?" In 1991, the American Heart Association indicated that an event occurred every 59,142 hours.[19] Recently, Haskell indicated that on several occasions, sudden cardiac death has been known to occur while patients are exercising.[16] Patients with symptomatic coronary artery disease are at particular risk. Haskell continues to report that if a program is properly monitored and prescribed, exercising is a safe and effective component of rehabilitation. There is also evidence that patients may not be aware of life threatening dysrhythmias. In an 8 center study of 61 patients requiring intervention, 67% were absent of symptoms at the time of dysrhythmia detection.[20] In this study, unifocal PVCs and ventricular tachycardia were the two most common dysrhythmias witnessed.

Evidence for Discontinuous Monitoring

Previous Studies

Although there is substantial evidence that when continuously monitored, patients are at lower risk, there is also evidence in favor of discontinuous monitoring. Greenland and Pomilla concluded that little evidence exists to support the necessity for continuous ECG monitoring for all patients during an exercise session.[1] This view was based on the relatively low risk of death in a supervised Phase II program due to the ability to rapidly resuscitate a patient. This claim is supported by the multicenter study conducted by Van Camp and Peterson in 1986 mentioned previously.[18] In this study, no significant difference in cardiac events was noted in programs whether continuous or discontinuous monitoring was used. Greenland and Pomilla also stated that fewer than 5% of rehabilitation patients benefited from continuous monitoring.[1] This conclusion was drawn from personal observations where changes in heart rate, blood pressure, or symptoms were deemed a better indicator of a cardiac event than ECG monitoring in 40% of patients requiring medical intervention.[1]

Psychological Dependence

In addition to arguments against the physical nature of continuous monitoring, there also seems to be an indication that a psychological dependence may develop. The American

College of Sports Medicine guidelines recommend that patients should be gradually taken off of continuous monitoring, instead relying on "quick looks", blood pressure monitoring, and ratings of perceived exertion (RPE).[12]

Lack of Scientific Evidence

There also appears to be a deficiency in the amount of scientific documentation when determining if continuous monitoring increases patient safety.[16] Evaluations of this nature are essential given the additional cost of equipment and staff to the rehabilitation program that comes with continuous monitoring.[16]

Summary

In general, it appears that proponents of continuous monitoring base their view on the detection of cardiac events while those advocating discontinuous monitoring support their claims with evidence related to statistical significance of detection frequency and overall cost. Although there is arguably evidence to support either side, it is clear that type and duration of monitoring should be guided by the patient's cardiovascular risk stratification (low, moderate, or high) which is based on a poor prognosis in coronary heart disease.[4] It may be concluded that patients in the high risk category should receive the most conservative (continuous) form of monitoring.

Financial Cost of Phase II Programs

The Rising Cost of Monitoring

Cost is undoubtedly the major source of conflict in Phase II programs. In fact, the major financial burden supported by a rehabilitation setting is considered to be continuous ECG monitoring.[21] In 1991, it was estimated that the cost per patient for an 8 week program was $670. This was broken down to $420 for equipment, $170 for staffing, and $80 for miscellaneous items. It was also estimated that the patient would spend $120 on clothing, shoes, transportation, etc. Therefore, the total cost was calculated at $790.[22] For a 12 week session consisting of 36 sessions in 1991, the average cost was estimated at $1080 to $3600.[13] By way of comparison, in 1989 the average cost was estimated at $1620 for a program of equal intensity and duration[1] which was an increase from the 1988 average of $1305. Based on these figures, it may be concluded that the cost of a continuously monitored program has been steadily rising over the years. Oldridge calculated in a speech given at the 1994 WISCVPR annual meeting that cardiac rehabilitation as a package costs $21,800 per life year gained and $9200 for what he terms a goal adjusted life year. Oldridge also added that while placing a dollar value on patient health may seem improper, it is necessary. In terms of equipment alone, in 1989 an ECG system with four receivers and transmitters cost $40,000.[1]

This represents an increase of just over $16,000 from 1984.[20] A 1994 estimate from an exercise physiologist indicated that telemetry units may range from $20,000 to $40,000. A representative of the Quinton telemetry company has indicated in 1994 that the cost of telemetry units may range from $14,550 to $23,300 with an additional $1575 per transmitter. Clearly, the cost of a continuously monitored program is an item of concern in professional circles. The dilemma then is, "How is this cost to be reimbursed?"

Reimbursement

Cost Figures

The greatest concern with regards to reimbursement is the trend of current changes in government policy on overall health care.[13] In 1990, $600 billion was spent for total health care in the United States. Of this, public factions such as Medicare and Medicaid covered $102 billion and $60 billion respectively. Private insurance companies spent $192 billion and patient out of pocket costs were determined to be $150 billion.[13] In 1992, the cost of overall health care increased to $838 billion at a cost of $3000 per person.[23] In 1991, more than one in four were affected by cardiovascular disease at a cost of $109 billion.[24] A significant portion of this cost can be accounted for by the uninsured parties who avoid seeking proper medical care and, as a result, do not receive the necessary cardiac care.[19] Fries, et al. confirmed this trend for 1992 indicating that well over 50 million

Americans were uninsured due to rising premium costs.[23] Recent figures estimate that 7 million Americans are affected by cardiovascular disease causing 1.5 million heart attacks and 500,000 deaths a year at an estimated cost of $135 billion.[25]

Public and Private Reimbursement

As previously mentioned, reimbursement may be public or private. Public reimbursement is based on United States Department of Health and Human Services (USDHHS) Guidelines and workmen's compensation. Criteria include a documented diagnosis of an acute myocardial infarction within the preceding year, previous coronary bypass surgery, and/or stable angina.[26] Premiums are collected by taxation. Agencies in this category include Medicare, Medicaid, the Bureau of Vocational Rehabilitation, Worker's Compensation for Medical Care, and Civilian Health and Medical Programs of Uniform Services (CHAMPUS).[13] Private insurance companies contract with individuals or groups. Benefits are determined by an agreement with the insurance company or an HMO.[13] At the 1994 Wisconsin Cardiovascular and Pulonary Rehabilitation annual meeting, Worel stated that capitation, the process of providing a set amount of money per covered life which may be applied to rehabilitation services as is deemed necessary, is a recently developing trend. A major question is, "Will cardiac rehabilitation receive enough money?" Worel believed

that by minimizing rehospitalizations, more money could be made available to cardiac rehabilitation.

What Insurance Covers

More important than whether the reimbursement is public or private is the issue of what is covered by the third party. Of the plans surveyed by a Blue Cross/Blue Shield study, 86% cover rehabilitation for myocardial infarction, coronary artery bypass grafts, and angina. Some of these covered angioplasty, transplants, hypertension, arrhythmias, and pace makers. Phase II programs were covered in only 43% of the plans surveyed.[27] Coverage for a stress test may be given if it is used for the evaluation of chest pain, exercise prescription for those with known cardiac disease, and pre and post evaluation of patients undergoing bypass procedures.[26]

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