ORIGINAL RESEARCH

Telephone Follow-Up for Patients After Myocardial Revascularization: A Systematic Review

Findings show evidence of benefit, but more research is needed.

Cardiovascular diseases are a leading cause of death worldwide. If current trends continue, it's estimated that mortality from such diseases will increase from 16.7 million in 2002 to 23.3 million in 2030.[1] Of deaths from coronary heart disease, an estimated 82% of the projected increase is expected to occur in developing countries.[2] In the United States, although such deaths have been declining,[2] coronary heart disease remains a significant threat. In 2007, it caused approximately one of every six deaths in this country.[3] More than 16 million adult Americans have coronary heart disease, with a total prevalence of 7% in this population.[3]

Myocardial revascularization has been an established treatment for coronary heart disease since the 1960s and is done via two procedures: coronary artery bypass graft (CABG) surgery and percutaneous coronary intervention (PCI).[4] The specific treatment is chosen based on its potential risks and benefits for the individual patient. Myocardial revascularization has been shown to relieve angina, improve exercise tolerance, increase long-term survival, and enhance quality of life.[5,6] But controlling for risk factors after each procedure is essential to stabilizing symptoms and preventing restenosis. Patients must be monitored closely, as recovery and rehabilitation can be difficult. After CABG surgery, patients can experience postoperative pain, insomnia, difficulty breathing, arrhythmias, palpitations, appetite changes, nausea, diarrhea, constipation, anxiety, depression, and edema, among other complications.[7,8] Potential complications following PCI include bleeding, vessel occlusion, vascular access complications, adverse reactions to radiographic contrast, and arrhythmias.[6]

A large number of complications occur at home.[9] Because reduced hospital stays have resulted in fewer opportunities to provide patients with information and to respond to their concerns while they are in the hospital, postdischarge follow-up is essential for teaching proper self-care. And follow-up care also fosters bonding between members of the health care team and the patient, which can enhance the patient's confidence in the team and create opportunities for the patient to address concerns and doubts.

Nursing teams have used telephone or e-mail contact (or both) to monitor patient care and to deliver care to patients with chronic conditions.[10-12] The goals of telephone follow-up have been described as essentially twofold: to increase adherence to treatment and to ease the transition from hospital to home by reducing stress through support and patient teaching.[13] Indeed, as a strategy, telephone follow-up may improve treatment and outcomes by facilitating the exchange of information, providing health education, improving symptom management, and permitting early recognition of complications.[13]

In evaluating the effectiveness of a telephone follow-up intervention, elements to consider include the intervention's specific goals; the training of the professional caller; the format and contents of calls; and the start time, frequency, and duration of calls. But little is known about what is optimal.[13] A Cochrane review of studies investigating the effects of follow-up telephone calls initiated by hospital-based health

By Rejane K. Furuya, RN, Luciana R. F. Mata, MSc, RN, Vivian S. Veras, MSc, RN, Aline H. Appoloni, MSc, RN, Rosana A. S. Dantas, PhD, RN, Renata C. C. P. Silveira, PhD, RN, and Lidia A. Rossi, PhD, RN

ABSTRACT

Objective: To identify studies of telephone follow-up conducted with patients who had undergone myocardial revascularization, and to assess and synthesize the results.

Design and methods: This is a systematic review; the literature search was conducted in six electronic databases. Controlled descriptors were *health education*, *teaching*, *myocardial revascularization*, *coronary artery bypass*, *angioplasty*, *telenursing*, *telephone*, and *hotlines*; the noncontrolled descriptor was *needs information*. Of 170 identified studies, seven met the inclusion criteria and were selected for analysis. The Jadad scale, which ranges from 0 to 5, was used to assess the methodological quality of studies, with scores of 3 to 5 indicative of higher quality.

Findings: Five of the seven studies found statistically significant positive changes in the outcome measures of health-related quality of life, pain, physical functioning, mood symptoms, anxiety, knowledge about self-care measures, medication compliance, and the lipid profile. Four of these five studies had a Jadad score of 3 and were of higher quality.

Conclusions: This review provides nurses and other clinicians with a synthesis of research on telephone follow-up in patients after myocardial revascularization. Of the seven studies analyzed, five showed evidence of some benefit from telephone follow-up. Their findings support the use of telephone follow-up to periodically assess patient knowledge, discuss patient concerns and offer ways to address them, monitor mood symptoms and anxiety levels, and encourage behavioral and lifestyle changes. Although any telephone follow-up intervention must be adapted according to each patient's needs, the lack of similarity among and specific information about the interventions described in the analyzed studies made it difficult to evaluate specific elements. More research is needed to identify optimal content and frequency, number, and duration of calls.

Keywords: coronary artery bypass graft surgery, coronary heart disease, health education, myocardial revascularization, systematic review, telephone intervention

professionals was inconclusive as to whether such follow-up was effective.[13] The review, conducted in 2003, included trials involving patients discharged from acute hospital settings to home. We decided to perform an update, focusing on a more specific population. We aimed to identify studies of telephone follow-up conducted in patients who had undergone myocardial revascularization and to assess and synthesize the results. We also sought to obtain more information about several elements of telephone follow-up, including the professional role of the caller; the format and contents of calls; and the start time, frequency, and duration of calls.

METHODS

This systematic review was conducted in accordance with the method described in the *Cochrane Handbook for Systematic Reviews of Interventions*.[14] The steps of this systematic review were as follows: (1) define the review question and develop criteria for including studies; (2) search for studies; (3) select studies and collect data; (4) assess risk of bias in included studies; (5) analyze data; (6) address reporting bias; (7) present results and "Summary of Findings" tables; (8) interpret results and draw conclusions.

The initial review question was, "What are the outcomes of telephone follow-up for patients after myocardial revascularization?" The inclusion criteria were articles on clinical trials (including uncontrolled trials, controlled trials, and randomized controlled trials) that studied patients after myocardial revascularization (via either CABG surgery or PCI) using telephone follow-up and that were published in English, Portuguese, or Spanish. No publication period limits were used. We excluded protocols, books, theses or dissertations, and articles about trials that studied preoperative telephone counseling.

In February 2011, four of us (RKF, LRFM, VSV, and AHA) searched for studies in six electronic databases: PubMed, Web of Science, Excerpta Médica (EMBASE), the Cumulative Index to Nursing and Allied Health Literature (CINAHL), Literatura Latino-Americana e do Caribe em Ciências da Saúde (LILACS), and the Cochrane Central Register of Controlled Trials.

We searched these databases using controlled descriptors from the National Library of Medicine's Medical Subject Headings (MeSH) vocabulary thesaurus as well as noncontrolled descriptors. Controlled descriptors (terms included in MeSH) were *health*

Table 1. Characteristics of Methods, Features, and Results of Included Studies on Telephone Intervention[a]

Study (Country) Type of Study Jadad Score	Sample and Outcome Measures	Instruments Used	Features of Telephone Intervention	Results	Limitations and Comments
Faulkner et al., 2000[21] (United States) RCT Jadad scale score: 3	CG: n = 15 IG: n = 15 Medication compliance, lipid profile	Compliance assessed by pill and packet counts at 6- and 12-week clinic visits Long-term compliance assessed by contacting pharmacies where patients filled their prescriptions at 1 and 2 years to document refill information "Patients returning more than 20% of prescribed pills at the 6- and 12-week visits and those failing to fill 80% or more of prescriptions at 1 and 2 years were considered noncompliant."	Pharmacist telephoned patients at home every week for 12 weeks and asked "a standard set of questions" Professional (pharmacist) initiated all calls	No significant difference in medication compliance between groups at 6 or 12 weeks. IG patients demonstrated significantly better long-term compliance than CG patients, with $P < 0.05$ "for all values groups" at 1 and 2 years. At 1 year, 67% of IG and 33% of CG patients were compliant for lovastatin and 47% of IG and 13% of CG patients were compliant for colestipol. At 2 years, 60% of IG and 27% of CG patients were compliant for lovastatin and 47% of IG and 7% of CG patients were compliant for colestipol. Changes in total cholesterol, LDL cholesterol, HDL cholesterol, and triglyceride levels were not significantly different between groups at 6 or 12 weeks. At 1 and 2 years, changes in total cholesterol, LDL cholesterol, and triglyceride levels showed significant improvement in IG patients ($P < 0.05$).	Small sample size
Hartford et al., 2002[20] (Canada) RCT Jadad scale score: 3	Patients: CG: n = 68 IG: n = 63 Partners: CG: n = 68 IG: n = 63 Anxiety	Instrument applied during hospitalization, on day 3 postdischarge, and during weeks 4 and 8 postdischarge BAI	A total of 6 calls were made to patients and partners on days 1, 2, and 4 and during weeks 1, 2, and 7 postdischarge Calls lasted 20 to 60 minutes Professional (nurse), patient, and patient's partner or family member initiated calls	On day 3 postdischarge, "a shift to lower anxiety categories occurred in both groups"; but the IG had "a significantly higher proportion of patients in the minimal anxiety category (60.7% versus 42.6%) and a lower proportion in the greater than minimal anxiety category (39.3% versus 57.4%)." The difference in the proportion of patients in each category was significant ($P < 0.041$). There were no differences between groups at 4 and 8 weeks. IG partners had nonsignificantly lower anxiety on day 3 and at week 4 postdischarge than CG partners.	The number of participants was lower than the sample size calculation indicated was required.

Parry et al., 2009[8] (Canada) RCT Jadad scale score: 3	CG: n = 50 IG: n = 45 Health-related quality of life, pain intensity and quality, pain-related interference with activities, number of patients who attended at least one session of cardiac rehabilitation program	Instruments applied in the preoperative period and at 9 weeks SF-36 McGill Pain Questionnaire–short form Brief Pain Inventory interference subscale Cardiac rehabilitation enrollment	Intervention period, 8 weeks; first call within 72 hours of hospital discharge Mean call duration, 15.7 ± 12.6 minutes; 94% of calls (n = 368) lasted less than 30 minutes Person responsible for follow-up, a trained peer volunteer, initiated all calls Patient and peer volunteer determined number and frequency of calls	Although differences didn't achieve statistical significance, the IG's best results were in the SF-36's role-physical functioning domain (between-group difference = 14 ± 36.3; $P = 0.06$) and physical component summary (between-group difference = 3.9 ± 11.8; $P = 0.12$). IG patients had nonsignificantly lower pain scores at 9 weeks ($P = 0.20$). IG patients reported nonsignificantly less interference in walking ($P = 0.13$) and in relations with others ($P = 0.14$) because of pain. 11 (25%) of IG and 6 (12%) of CG patients participated in a rehabilitation program, but the between-group difference was not significant ($P = 0.11$).	Pilot study, with small sample size Patients reported from memory in scoring their "worst pain in the previous 24 hours with movement" 9 weeks after surgery. This outcome may not be reliable.
Rollman et al., 2009[19] (United States) RCT Jadad scale score: 3	CG: n = 152 IG: n = 150 Comparison group (without depression): n = 151 Health-related quality of life, physical functioning, mood symptoms, rehospitalizations	Instruments applied after 2 weeks of follow-up and at 2, 4, and 8 months SF-36 DASI HRS-D Interview (assessors inquired about hospitalization experienced since last assessment)	During the acute phase of treatment, patient was called every 2 weeks for 15 to 45 minutes, continuing for 2 to 4 months. In the next phase, calls were monthly or bimonthly until the end of the 8 months of follow-up. Professional (nurse care manager) initiated all calls	IG patients achieved significant clinical improvements on the SF-36 mental component summary (between-group difference = 3.2; 95% CI, 0.5-6.0; $P = 0.02$) with an effect size of 0.30 (95% CI, 0.17-0.52; $P = 0.01$). IG patients showed significant clinical improvements in physical functioning (between-group difference = 4.6; 95% CI, 1.9-7.3; $P = 0.001$). 50% (75/150) of IG vs. 29.6% (45/152) of CG patients reported 50% or greater reduction in mood symptoms from baseline to 8-month follow-up; the number needed to treat to produce one additional treatment response was 4.9 (95% CI, 3.2-10.4; $P < 0.001$). 207 rehospitalizations occurred, and 33% of IG, 32% of CG, and 25% of patients without depression were hospitalized.	Of those patients approached, many (n = 572) refused to participate. If many patients with severe depression refused to participate, a selection bias might have occurred.

Table 1. Continued

Morone et al., 2010[18] (United States) RCT Jadad scale score: 3	CG: n = 152 IG: n = 150 Comparison group (without depression): n = 151 Pain, physical functioning, mood symptoms	Instruments applied after 2 weeks of follow-up and at 2, 4, 6, 8, and 12 months SF-36 bodily pain scale DASI HRS-D	During the acute phase of treatment, patient was called every 2 weeks for 15 to 45 minutes, continuing for 2 to 4 months. In the next phase, calls were monthly or bimonthly until the end of the 8 months of follow-up. Professional (nurse care manager) initiated all calls	IG patients reported significantly less pain at 12 months than CG patients ($P < 0.05$). Intervention had a significant effect on improvement in physical function at 12 months ($P = 0.04$). IG patients with moderate pain improved at the same rate as CG patients with no or mild pain. Intervention had a significant effect on improvement of depression in IG patients compared with CG patients ($P = 0.02$). Effect was seen regardless of pain status.	This was a secondary data analysis. The intervention did not include treatment for pain control. The SF-36's bodily pain scale may not be the best way to assess pain.
Beckie, 1989[17] (Canada) RCT Jadad scale score: 1	CG: n = 37 IG: n = 37 Knowledge, anxiety	Instruments applied 6 weeks after hospital discharge Knowledge test based on Orem's self-care framework of nursing care State Anxiety Inventory	4 to 6 calls Started during the first week after hospital discharge and continued for 6 weeks Nurse negotiated date, time, and number of subsequent calls with patients Professional (cardiac rehabilitation nurse specialist) initiated all calls	Of 70 possible points on the knowledge test, IG patients achieved a raw score mean of 67.73 ± 1.43 and CG patients achieved a raw score mean of 52.40 ± 6.28 ($P = 0.00$). On the anxiety assessment, IG patients' mean score was 29.78 ± 7.72; CG patients' mean score was 43.22 ± 11.52 ($P = 0.00$). Negative moderate correlation ($r = -0.61$, $P < 0.05$) between CG patients' knowledge and anxiety levels; negative correlation ($r = -0.31$, $P < 0.05$) between IG patients' knowledge and anxiety levels was "less pronounced."	Small sample size No baseline assessments of the outcomes were included; outcomes were assessed only after the intervention. No specific information was provided on withdrawals or dropouts or on randomization.
Barnason, Zimmerman, 1995[16] (United States) RCT Jadad scale score: 1	CG (usual care—inpatient teaching alone): n = 30 IG group 1 (usual care plus telephone follow-up): n = 30 IG group 2 (usual care plus postdischarge group teaching): n = 30 Teaching satisfaction, cognitive knowledge	Instruments applied 2 weeks after hospital discharge CSPTSI HDMQ	Telephone intervention began in the second week after hospital discharge Date for the telephone call was scheduled before hospital discharge Professional (cardiac rehabilitation nurse) initiated the call	Patient satisfaction with teaching showed no significant differences between groups ($P = 0.86$). Mean total satisfaction scores were: usual care, 3.24 ± 0.63; usual care plus telephone follow-up, 3.14 ± 0.93; and usual care plus postdischarge group teaching, 3.13 ± 0.95. Assessment of patient knowledge levels showed no significant differences between groups ($P = 0.48$). Mean total knowledge scores were: usual care, 85.67 ± 8.07; usual care plus telephone follow-up, 88 ± 8.47; and usual care plus postdischarge group teaching, 88 ± 9.06. "Older subjects (patients 70 years and older) in the telephone teaching group had lower knowledge scores than subjects in either of the other two teaching groups" ($P = 0.00$).	No specific information was provided on withdrawals or dropouts or on randomization.

BAI = Beck Anxiety Inventory; CG = control group; CI = confidence interval; CSPTSI = Cardiac Surgical Patient Teaching Satisfaction Inventory; DASI = Duke Activity Status Index; HDL = high-density lipoprotein; HDMQ = Heart Disease Management Questionnaire; HRS-D = Hamilton Rating Scale for Depression; IG = intervention group; LDL = low-density lipoprotein; RCT = randomized controlled trial; SF-36 = Medical Outcomes Study 36-Item Short-Form Health Survey.

[a] Plus–minus values are means ± SD.

education, *teaching*, *myocardial revascularization*, *coronary artery bypass*, *angioplasty*, *telenursing*, *telephone*, and *hotlines*. The noncontrolled descriptor (a term used in practice and research but not included in MeSH) was *needs information*.

The initial search yielded a total of 169 articles. One of us (RKF) screened the titles and abstracts of these articles according to the inclusion and exclusion criteria. Another one of us (LAR) resolved selection conflicts.

Telephone follow-up was an effective intervention for most of the outcomes assessed.

Of the 169 initially identified studies, 150 did not meet the inclusion criteria and were excluded for the following reasons: the telephone was used for data collection only (63); patients had other diagnoses (28); other procedures were performed (4); the study was not of the specified design (11); telephone counseling was done only before surgery (16); the study was published as a protocol, book chapter, or thesis or dissertation (5); the study didn't focus on cardiac patients and telephone follow-up (21); or the language of the publication wasn't as specified (2). Of the 19 remaining studies, 13 were duplicates and were excluded. We then hand-searched the reference lists of the six remaining articles for additional sources, and this yielded one additional article. Seven studies met the inclusion criteria and were selected for analysis. Figure 1 shows the identification, exclusion, and inclusion flow of the 170 studies.

Data extraction was performed using an instrument based on those described in the *Cochrane Handbook for Systematic Reviews of Interventions*.[14] The following information was extracted: article title, journal of publication, year of publication, and database where the article was found; and study data collection site, objective, methodological details, interventions, outcome measures and statistical analysis, results, implications for practice, evidence level, and Jadad scale score (a measure of methodological quality). Two of us literate in English, Spanish, and Portuguese extracted the data. One (RKF) did the initial extraction and another (LAR) checked the extracted data against each article and study.

Each study's methodological quality was assessed using the Jadad scale.[15] The total score can range from 0 to 5. Studies scoring 0 to 2 are considered to be of lower quality, while those scoring 3 to 5 are considered to be of higher quality. (For details on scoring, see *The Jadad Scale*.[15])

Studies that looked at the same outcome were grouped. Meta-analysis was not possible because of the heterogeneous outcomes of the studies. Instead, data were analyzed using descriptive analysis.

FINDINGS

Of the seven studies selected for analysis, five were found on PubMed,[8, 16-19] one on EMBASE,[20] and one by hand search.[21] One study[18] was a secondary data analysis of a previous study.[19, 22] Table 1[8, 16-21] provides details on each study, including type of study, Jadad score, sample and outcome measures, instruments used, features of telephone intervention, results, and limitations.

Five of the seven studies scored 3 on the Jadad scale and were considered of high quality.[8, 18-21] These studies were limited because they were not double blind; blinding occurred only when the results were assessed. Two studies had a Jadad score of 1.[16, 17] Withdrawals or dropouts were not described; and the studies were randomized, but randomization quality could not be assessed.

Of the seven studies analyzed, six involved patients followed after CABG surgery[8, 16-20] and one involved patients followed after either CABG surgery or PCI.[21]

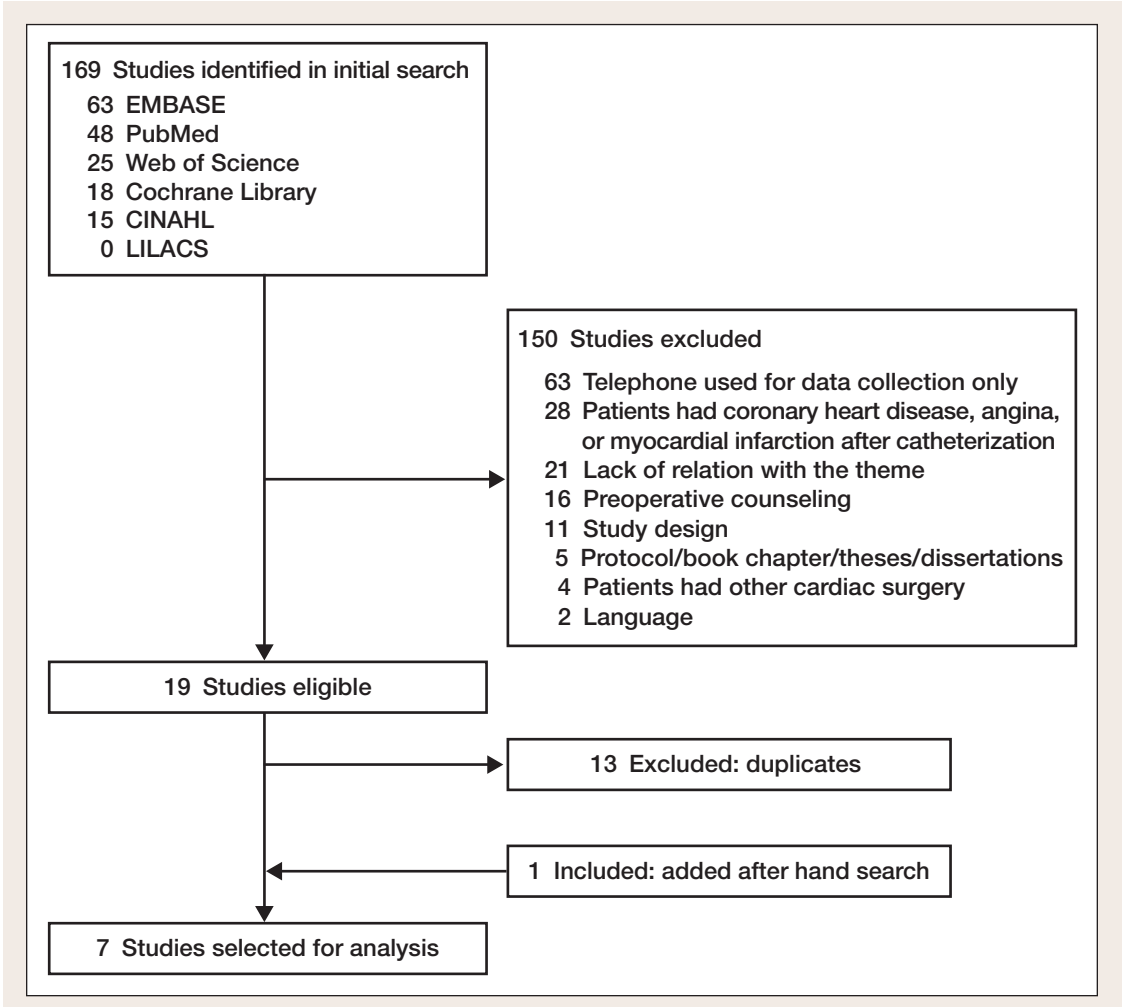
Intervention purpose and content. The purposes of telephone follow-up were to improve pain management and encourage exercise and participation in a rehabilitation program[8]; review psychiatric history, provide education about depression and its effects on cardiac disease, and describe treatment options[18, 19]; provide information and support for patients and

The Jadad Scale[15]

The Jadad scale has two parts. The first part consists of three questions: "Was the study described as randomized?" "Was the study described as double blind?" and "Was there a description of withdrawals and dropouts?" Each yes response counts as 1 point.

The second part consists of two items that ask, first, whether the method used to generate the sequence of randomization was described and was appropriate; and second, whether the method of blinding was described and was appropriate. If the method of randomization was described and appropriate, a point is added; if it was described but inappropriate, a point is deducted. Similarly, if the method of blinding was described and appropriate, a point is added; if it was described but inappropriate, a point is deducted. Thus the total score can range from 0 to 5.

Figure 1. Flowchart of Identified, Excluded, and Selected Studies



their partners according to their needs[20]; reinforce patient teaching received during hospitalization and provide information about specific concerns regarding rehabilitation[16, 17]; and emphasize the importance of pharmacotherapy in reducing the risk of recurrent cardiac events.[21]

We found that the contents of telephone follow-up for patients in the seven analyzed studies could be grouped into four themes: cardiovascular illness; postoperative complications; self-care, including behavioral and lifestyle changes; and psychosocial evaluation and emotional support (see Table 2[8, 16-21]).

In three studies, the calls were comprehensive and covered several problems and concerns identified in the literature.[16, 17, 20] In two of these, the content of the calls was specified; topics common to both were guidelines for activity and exercise progression; risk factor modification, including smoking cessation; and diet.[16, 20] Topics specific to one study were pain, constipation, sleep, psychosocial problems, medications, cardiac disease and cardiovascular risk factors, and diagnostic tests[20]; topics specific to the other study were wound healing and trajectory of the surgical recovery process, signs and symptoms of angina and myocardial infarction, incision care, and methods for enrolling in cardiac rehabilitation.[16] In the third study, nurses used telephone follow-up to assess the patients' lifestyle, attitudes, feelings about their illness and treatment, and receptivity to new information; and to provide information on cardiovascular illness, self-care measures, and treatment regimens.[17]

Call content in the other four studies was specific to the assessed outcome. In one study, which looked at the effects of peer support on recovery outcomes, calls were focused on pain management, exercise, and encouraging patients to attend a cardiac rehabilitation program.[8] In another study, the emphasis was on the importance of drug therapy in reducing

the risk of recurrent cardiac events.[21] Patients were asked "about when and where prescriptions were filled, how they paid for their prescriptions, potential side effects, overall well-being, and specific reasons for noncompliance when applicable."

Ideally, telephone follow-up should offer both patients and family members the opportunity to initiate the call.

In one of the two studies specific to treatment of post-CABG depression, the purpose of telephone follow-up was to review psychiatric history, provide education about depression and its effect on cardiac disease, and describe treatment options[19]; in the other, it was to review psychiatric history, provide education about depression, monitor antidepressant pharmacotherapy and assess response, and encourage follow-up with the primary care physician and mental health specialist.[18]

Timing of intervention and follow-up personnel. In all seven studies, telephone interventions were started within two weeks after hospital discharge. The earliest start occurred on the first day after discharge.[20] Telephone follow-up time ranged from six weeks[17] to eight months.[18, 19] Four studies provided the total number of calls made, which ranged from one to 12.[16, 17, 20, 21]

In one study, both the patient and the patient's partner (or another designated family member) could call the professional responsible for follow-up.[20] Only three studies described the duration of calls, which ranged from 15 to 45 minutes in one study[19] to 20 to 60 minutes in another.[20] The third study reported a mean (± SD) call duration of 15.7 (± 12.6) minutes.[8]

In five of the seven analyzed studies, nurses made the calls.[16-20] They obtained and reviewed the patient's history,[18, 19] provided information and education,[16-20] conveyed professional recommendations,[18, 19] monitored pharmacotherapy,[18, 19] gave emotional support,[17-20] clarified additional topics patients raised,[16] improved patients' decision making and coping skills,[17] and helped patients to solve problems with implementing the recommendations.[17]

In one study, a pharmacist made the phone calls[21]; in another, the calls were made by trained peer volunteers (people who had themselves undergone CABG surgery within the past five years).[8]

Outcome measures assessed in the studies were health-related quality of life,[8, 19] pain,[8, 18] enrollment in cardiac rehabilitation programs,[8] physical functioning,[19] hospital readmission,[19] mood symptoms,[19] anxiety,[17, 20] knowledge about self-care measures,[16, 17] satisfaction with teaching,[16] medication compliance,[21] and the lipid profile.[21]

The two studies that assessed health-related quality of life used the Medical Outcomes Study 36-Item Short-Form Health Survey (SF-36).[8, 19] One study found that, compared with controls, patients in the intervention group displayed significant clinical improvements on this and other outcome measures (physical functioning, hospital readmission, and mood symptoms).[19] Although between-group differences in the other study did not reach statistical significance, results for the intervention group were best in the SF-36's role-physical functioning domain and physical component summary.[8]

For pain assessment, one study used the short form of the McGill Pain Questionnaire and the Brief Pain Inventory interference subscale,[8] while another used the SF-36's bodily pain scale.[18] In both studies, patients in the intervention group reported lower pain intensities than did controls, although the difference

Table 2. Themes in Telephone Follow-up for Patients After Myocardial Revascularization

Cardiovascular illness
• Coronary heart disease[17, 20]
• Signs and symptoms of angina and myocardial infarction[16]
• Diagnostic tests[20]
Postoperative complications
• Pain[8, 20]
• Constipation[20]
• Sleep difficulties[20]
• Incision care and wound healing[16]
Self-care, including behavioral and lifestyle changes
• Activity and exercise[8, 16, 17, 20]
• Diet[16, 17, 20]
• Medication compliance[17-21]
• Enrolling in cardiac rehabilitation[8, 16, 17]
• Risk factor modifications (such as smoking cessation; weight loss; dietary improvements; increased exercise; stress modification; control of cholesterol, blood pressure, and blood sugar)[16, 17, 20]
Psychosocial evaluation and emotional support
• Emotional support[17-20]
• Listening to concerns[17-20]
• Encouraging achievements and treatment follow-up[18-20]
• Evaluation of mental health[18-20]

was statistically significant in only one of the studies.[18]

To assess anxiety, one study used the Beck Anxiety Inventory,[20] and another, the State Anxiety Inventory.[17] In both studies, anxiety levels were significantly lower in patients in the intervention group compared with those in the control group. Another study assessed mood using the Hamilton Rating Scale for Depression. Compared with controls, more patients in the intervention group reported that their mood symptoms were reduced by 50% or more from baseline.[19] Patients' knowledge about self-care measures following cardiac surgery was assessed in two studies,[16, 17] with intervention group patients displaying significantly higher knowledge levels than control group patients in only one.[17]

Since patient education is already an essential part of nursing care, having nurses perform telephone follow-up may be best.

In a study that assessed compliance with the medication regimen, no significant difference in compliance between groups was seen at six or 12 weeks into the 12-week intervention.[21] But patients in the intervention group demonstrated significantly better long-term compliance than those in the control group at one and two years after the intervention. In the same study, changes in the lipid profile were not significantly different between the groups at six or 12 weeks. But at one and two years after the intervention, changes in total cholesterol, low-density lipoprotein cholesterol, and triglyceride levels were significantly better in the intervention group.

In summary, telephone follow-up was an effective intervention for most of the outcomes assessed. Statistically significant results were seen for telephone follow-up in improvements in health-related quality of life,[19] pain,[18] physical functioning,[19] mood symptoms,[19] anxiety,[17, 20] knowledge about self-care measures,[17] medication compliance,[21] and the lipid profile.[21]

DISCUSSION

Outcomes assessed. Of the seven studies analyzed, five provided evidence that telephone follow-up was effective in providing support and information and that it improved the following outcomes: health-related quality of life,[19] pain,[18] physical functioning,[19] mood symptoms,[19] anxiety,[17, 20] knowledge about self-care measures,[17] and (in the long term, at one and two years postintervention) the lipid profile.[21] However, only one study evaluated the impact of telephone follow-up on medication compliance, and improvement was seen only long term.[21]

Rollman and colleagues found that telephone follow-up was associated with clinically significant improvements in health-related quality of life.[19] The SF-36 mental health component scale score was the primary outcome measure; a between-group difference of 3.2 points was observed.[19] (The smallest clinically important change in score for the SF-36 has not been established; however, for its scale of 0 to 100 and based on previous testing of the instrument,[23] we considered a 3-point change to reflect the smallest clinically significant effect.) The same study also found significant between-group differences in the secondary outcomes of physical functioning and mood symptoms. Such outcomes are important in patients who undergo myocardial revascularization; indeed, improving health-related quality of life is a goal of this treatment.[5]

Statistically significant improvements in pain levels, assessed using the SF-36 bodily pain scale, were associated with telephone follow-up in the study by Morone and colleagues.[18] A between-group difference of 3 points was observed.[18] Pain is frequently experienced by patients after myocardial revascularization and is associated with angina and surgical wounds.[24] Although pain wasn't specifically addressed by the intervention, it's possible that the improvements were related to the patients receiving frequent attention by phone and that this encouraged adherence to treatment instructions.

Anxiety is frequently associated with coronary heart disease.[25] In the study by Hartford and colleagues, the intervention group had a higher proportion of patients categorized as having minimal anxiety, and a lower proportion categorized as having greater-than-minimal anxiety, compared with the control group; this study assessed anxiety using the Beck Anxiety Inventory.[20] These differences were statistically significant.

In a study by Beckie, which assessed anxiety using the State Anxiety Inventory, anxiety levels were also lower in the intervention group compared with the control group (29.78 ± 7.72 versus 43.22 ± 11.52).[17] Possible scores for this inventory range from 20 to 80, with a higher score indicating a greater anxiety level. Based on the Jacobson method for determining clinical significance, as described by Fisher and Durham,[26] we concluded that these results were clinically significant.

Beckie also assessed the effects of telephone follow-up on knowledge levels, using a knowledge test based on Orem's self-care framework, and found that patients in the intervention group had significantly higher knowledge levels than controls.[17] Although this study is over 20 years old, we considered the

results still valid. The areas of knowledge assessed by the test—coronary heart disease and related self-care measures, diet, medication, physical activity restrictions, exercise, and rest—remain important. The telephone follow-up was designed to help patients gain knowledge and improve their decision-making and coping skills, thereby decreasing their anxiety.

Lifestyle changes are important in managing coronary heart disease. Prevention of secondary coronary events and complications after diagnosis is mainly achieved through a combination of medication and nonpharmacologic strategies (primarily behavior modification).[27] Thus, assessment of medication adherence, the lipid profile, mood symptoms, and anxiety is essential. It's also important to assess patients' knowledge about self-care measures. Frick and colleagues found that doing so could improve clinicians' understanding of patients' information needs and could help with redesign of patient teaching, which in turn might improve adherence to long-term treatment.[28]

Two studies—those by Barnason and Zimmerman and by Parry and colleagues—found no significant results for any assessed outcomes.[8, 16] Regarding telephone follow-up, in the study by Parry and colleagues, there was no information on the number and frequency of calls, which were made by trained peer volunteers.[8] In the other study, only one call was made.[16]

follow-up can improve treatment and outcomes. Indeed, more recent studies of telephone follow-up in patients with other conditions also support this; for example, in one study patients who received telephone follow-up following knee arthroscopy reported fewer symptoms of distress at 72 hours and one week after surgery.[29] But our review is unique in that it focused on the impact of telephone follow-up in a specific population, patients who have undergone myocardial revascularization. We also described several elements of telephone follow-up, such as the professional role of the caller; the format and content of calls; and their start time, frequency, and duration.

Elements of follow-up. In all seven of the studies, telephone follow-up was started within the first two weeks after hospital discharge, a start-time "window" that may be best. Mistiaen and Poot noted that "postdischarge problems are most intense in the period immediately after hospital discharge."[13] In one study of patients who had undergone CABG surgery, 75% of such problems occurred within the first 14 days after discharge.[30] And in six of the seven studies, calls were initiated by a nurse, pharmacist, or peer volunteer, rather than by the patient or a family member. In only one study could the patient or a family member call the health care professional.[20] Research suggests that a combination of calls initiated by the professional and by the patient may be

In one study of patients who had undergone CABG surgery, 75% of postdischarge problems occurred within the first 14 days after discharge.

Of the two studies that assessed health-related quality of life,[8, 19] in the study by Rollman and colleagues, which found that patients in the intervention group displayed significant clinical improvements compared with controls, telephone follow-up was done by nurses; and patients were called every two weeks for two to four months, then monthly or bimonthly until the eight-month intervention ended.[19] In the study by Parry and colleagues, which did not demonstrate significant between-group improvements, trained peer volunteers made the calls; call frequency was determined during each telephone interaction, and the intervention lasted for eight weeks.[8] This suggests that having nurses make the calls and calling patients more often over a longer duration may be important to an intervention's success.

As did the 2006 Mistiaen and Poot review,[13] our systematic review found some evidence that telephone

more effective.[31] We believe that ideally telephone follow-up should offer both patients and family members the opportunity to initiate the call.

Since the number of selected studies was small and the variation in call particulars was wide (for example, the number of calls ranged from one to 12, with interventions lasting from six weeks to eight months), we cannot recommend an ideal protocol for the frequency, number, or duration of calls. A single call appears to be insufficient for improving outcomes.[16] Still, the need for telephone follow-up is clear. An older study by Goodman found that postsurgical cardiac patients expressed a need for a postdischarge connection to the hospital, to talk about their health concerns and receive emotional support.[32] Indeed, one large review concluded that "telephone interviews can be as effective as face-to-face sessions" in encouraging treatment adherence.[31] And another

review regarding the delivery of clinical care by telephone found that "people want to be able to consult their doctors by telephone and are very satisfied with this mode of communication."[33] It stands to reason, then, that the frequency of calls will depend on the patient's recovery phase. At least three calls appear to be necessary: the first should focus primarily on self-management of postoperative symptoms and complications and on dietary changes; the second should also address resuming daily activities, exercise, and self-management of lifestyle changes; and the third should include social adjustment. Psychosocial evaluation and emotional support should occur at all phases.

At least three calls appear to be necessary: the first should focus on self-management of postoperative symptoms and dietary changes; the second should address resuming daily activities, exercise, and lifestyle changes; and the third should include social adjustment.

Follow-up can also be conducted by other means than the telephone, such as through text messaging or e-mail or a combination of these. Such alternatives are both inexpensive and easy to implement but may be practical for fewer people, as they require access to computers or cell phones as well as a degree of technological literacy. Further studies investigating the efficacy of these alternative follow-up methods are needed.

The seven analyzed studies provided little detail about intervention content. In only one study, that by Hartford and colleagues, did the content cover all four of the themes we identified—cardiovascular illness, postoperative complications; self-care, including behavioral and lifestyle changes; and psychosocial evaluation and emotional support.[20] Of these themes, the last two were the most commonly covered during telephone follow-up in the seven studies. But a telephone conversation addressing these themes—which include risk factor modification and listening to patient concerns—might also cover patient knowledge about the illness and postoperative complications. The organization of call content by theme might help nurses to systematize the knowledge to be emphasized with patients.

In five of the seven analyzed studies, nurses performed the telephone follow-up[16-20]; and in all five the content was more comprehensive, covering both education and counseling for patients discharged after myocardial revascularization. The results were not significant in only one study in which nurses made the calls, and that may have been because just one call per patient was made.[16] In the study in which calls were made by trained peer volunteers, the focus of the calls was limited and the results weren't significant.[8] This suggests that having nurses perform telephone follow-up, providing patients with education and support and addressing their postdischarge concerns, may be best. Patient education is already an essential component of nursing care, aimed at enhancing self-care behaviors, reducing symptoms and complications, and improving quality of life.

Limitations. One limitation of this review is the small number of clinical trials on the subject of interest. Another limitation was that of language, since we excluded any studies not published in English, Portuguese, or Spanish. For studies of telephone follow-up as an intervention, blinding is not feasible; both patients and researchers will be aware of its implementation. Lastly, the wide range of intervention variables and outcome measures hampered comparison among the studies.

CONCLUSIONS

This review provides nurses and other clinicians with a summary of research on telephone follow-up for patients after myocardial revascularization. Of the seven studies analyzed, five were of high quality and provided evidence that telephone follow-up had positive effects on the outcomes measured. The findings support the use of telephone follow-up to periodically assess patient knowledge, discuss patient concerns and offer help in addressing them, monitor mood symptoms and anxiety levels, and encourage behavioral and lifestyle changes. Although we cannot recommend an ideal content protocol, we believe call content should address the following themes: knowledge about cardiovascular illness; postoperative complications; self-care, including behavioral and lifestyle changes; and psychosocial evaluation and emotional support.

Although any telephone follow-up intervention must be adapted according to each patient's needs, the lack of similarity among and specific information about the interventions described in the analyzed studies made it difficult for us to evaluate specific elements.

More research is needed regarding such elements, including the optimal frequency, number, and duration of calls. ▼

For 38 additional continuing nursing education articles on research topics, go to www.nursingcenter.com/ce.

Rejane K. Furuya, Luciana R. F. Mata, Vivian S. Veras, and Aline H. Appoloni are doctoral candidates at the College of Nursing, University of São Paulo, Ribeirão Preto, Brazil, where Rosana A. S. Dantas is an associate professor, Renata C. C. P. Silveira is an assistant professor, and Lidia A. Rossi is a full professor in the Department of General and Specialized Nursing. At the time of this study, Aline H. Appoloni was a master's candidate in the graduate nursing program at the Federal University of São Carlos, São Carlos, Brazil. *This study was sponsored by an unrestricted educational grant from the São Paulo Research Foundation.* *Contact author: Lidia A. Rossi, rizzardo@eerp.usp.br.* *The authors and planners have disclosed no potential conflicts of interest, financial or otherwise.*

REFERENCES

1. Mathers CD, Loncar D. Projections of global mortality and burden of disease from 2002 to 2030. *PLoS Med* 2006;3(11):e442.
2. Mackay J, Mensah GA. *The atlas of heart disease and stroke*. Geneva, Switzerland: World Health Organization 2004 Sep. http://www.who.int/cardiovascular_diseases/resources/atlas/en.
3. Roger VL, et al. Heart disease and stroke statistics—2011 update: a report from the American Heart Association. *Circulation* 2011;123(4):e18-e209.
4. Task Force on Myocardial Revascularization of the European Society of Cardiology, the European Association for Cardio-Thoracic Surgery, European Association for Percutaneous Cardiovascular Interventions, et al. Guidelines on myocardial revascularization. *Eur Heart J* 2010;31(20):2501-55.
5. Eagle KA, et al. ACC/AHA 2004 guideline update for coronary artery bypass graft surgery: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Committee to Update the 1999 Guidelines for Coronary Artery Bypass Graft Surgery). *Circulation* 2004;110(14):e340-e437.
6. Smith SC, Jr., et al. ACC/AHA/SCAI 2005 guideline update for percutaneous coronary intervention: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (ACC/AHA/SCAI Writing Committee to Update 2001 Guidelines for Percutaneous Coronary Intervention). *Circulation* 2006;113(7):e166-e286.
7. Cebeci F, Celik SS. Discharge training and counselling increase self-care ability and reduce postdischarge problems in CABG patients. *J Clin Nurs* 2008;17(3):412-20.
8. Parry MJ, et al. Cardiac Home Education and Support Trial (CHEST): a pilot study. *Can J Cardiol* 2009;25(12):e393-e398.
9. Hartford K. Telenursing and patients' recovery from bypass surgery. *J Adv Nurs* 2005;50(5):459-68.
10. Bragadottir H. Computer-mediated support group intervention for parents. *J Nurs Scholarsh* 2008;40(1):32-8.
11. Racelis MC, et al. Impact of telephone reinforcement of risk reduction education on patient compliance. *J Vasc Nurs* 1998;16(1):16-20.
12. Vale MJ, et al. Coaching patients with coronary heart disease to achieve the target cholesterol: a method to bridge the gap between evidence-based medicine and the "real world"—randomized controlled trial. *J Clin Epidemiol* 2002;55(3):245-52.
13. Mistiaen P, Poot E. Telephone follow-up, initiated by a hospital-based health professional, for postdischarge problems in patients discharged from hospital to home. *Cochrane Database Syst Rev* 2006(4):CD004510.
14. Higgins JPT, Green S, editors. *Cochrane handbook for systematic reviews of interventions version 5.1.0 [updated March 2011]*: The Cochrane Collaboration 2011. http://www.cochrane.org/training/cochrane-handbook.
15. Jadad AR, et al. Assessing the quality of reports of randomized clinical trials: is blinding necessary? *Control Clin Trials* 1996;17(1):1-12.
16. Barnason S, Zimmerman L. A comparison of patient teaching outcomes among postoperative coronary artery bypass graft (CABG) patients. *Prog Cardiovasc Nurs* 1995;10(4):11-20.
17. Beckie T. A supportive-educative telephone program: impact on knowledge and anxiety after coronary artery bypass graft surgery. *Heart Lung* 1989;18(1):46-55.
18. Morone NE, et al. The impact of pain and depression on recovery after coronary artery bypass grafting. *Psychosom Med* 2010;72(7):620-5.
19. Rollman BL, et al. Telephone-delivered collaborative care for treating post-CABG depression: a randomized controlled trial. *JAMA* 2009;302(19):2095-103.
20. Hartford K, et al. Randomized controlled trial of a telephone intervention by nurses to provide information and support to patients and their partners after elective coronary artery bypass graft surgery: effects of anxiety. *Heart Lung* 2002;31(3):199-206.
21. Faulkner MA, et al. Impact of pharmacy counseling on compliance and effectiveness of combination lipid-lowering therapy in patients undergoing coronary artery revascularization: a randomized, controlled trial. *Pharmacotherapy* 2000;20(4):410-6.
22. Rollman BL, et al. The Bypassing the Blues treatment protocol: stepped collaborative care for treating post-CABG depression. *Psychosom Med* 2009;71(2):217-30.
23. Stewart AL, et al. Functional status and well-being of patients with chronic conditions. Results from the Medical Outcomes Study. *JAMA* 1989;262(7):907-13.
24. Theobald K, McMurray A. Coronary artery bypass graft surgery: discharge planning for successful recovery. *J Adv Nurs* 2004;47(5):483-91.
25. Rozanski A, et al. Impact of psychological factors on the pathogenesis of cardiovascular disease and implications for therapy. *Circulation* 1999;99(16):2192-217.
26. Fisher PL, Durham RC. Recovery rates in generalized anxiety disorder following psychological therapy: an analysis of clinically significant change in the STAI-T across outcome studies since 1990. *Psychol Med* 1999;29(6):1425-34.
27. Weiner SD, Rabbani LE. Secondary prevention strategies for coronary heart disease. *J Thromb Thrombolysis* 2010;29(1):8-24.
28. Frick U, et al. A questionnaire on treatment satisfaction and disease specific knowledge among patients with acute coronary syndrome. II: Insights for patient education and quality improvement. *Patient Educ Couns* 2012;86(3):366-71.
29. Jones D, et al. Randomized clinical trial testing efficacy of a nurse-coached intervention in arthroscopy patients. *Nurs Res* 2011;60(2):92-9.
30. Wu CY. Assessment of postdischarge concerns of coronary artery bypass graft patients. *J Cardiovasc Nurs* 1995;10(1):1-7.
31. McBride CM, Rimer BK. Using the telephone to improve health behavior and health service delivery. *Patient Educ Couns* 1999;37(1):3-18.
32. Goodman H. Patients' perceptions of their education needs in the first six weeks following discharge after cardiac surgery. *J Adv Nurs* 1997;25(6):1241-51.
33. Car J, Sheikh A. Telephone consultations. *BMJ* 2003;326(7396):966-9.