Nursing Research • July/August 2005 • Vol 54, No 4, 243–254

The Effectiveness of a Nursing Inpatient Smoking Cessation Program in Individuals With Cardiovascular Disease

Maud-Christine Chouinard ▼ Sylvie Robichaud-Ekstrand

- ***Background:*** Smoking is an important risk factor for cardiovascular disease (CVD), and quitting is highly beneficial. Yet, less than 30% of CVD patients stop smoking. Relapse-prevention strategies seem most effective when initiated during the exacerbation of the disease.
- ***Objective:*** A nurse-delivered inpatient smoking cessation program based on the Transtheoretical Model with telephone follow-up tailored to levels of readiness to quit smoking was evaluated on smoking abstinence and progress to ulterior stages of change.
- ***Method:*** Participants (N = 168) were randomly assigned by cohorts to inpatient counseling with telephone follow-up, inpatient counseling, and usual care. The inpatient intervention consisted of a 1-hr counseling session, and the telephone follow-up included 6 calls during the first 2 months after discharge. The nursing intervention was tailored to the individual's stage of change. End points at 2 and 6 months included actual and continuous smoking cessation rates (biochemical markers) and increased motivation (progress to ulterior stages of change).
- ***Results:*** Assuming that surviving patients lost to follow-up were smokers, the 6-month smoking abstinence rate was 41.5% in the inpatient counseling with telephone follow-up group, compared with 30.2% and 20% in the inpatient counseling and usual care groups, respectively (p = .05). Progress to ulterior stages of change was 43.3%, 32.1%, and 18.2%, respectively (p = .02). Stage of change at baseline and intervention predicted smoking status at 6 months.
- ***Discussion:*** This tailored smoking cessation program with telephone follow-up significantly increased smoking cessation at 6 months, and progression to ulterior stages of change. The telephone follow-up was an important adjunct. It is, therefore, recommended to include such comprehensive smoking cessation programs within hospital settings for individuals with CVD.

- ***Key Words:*** cardiovascular disease · smoking cessation · transtheoretical model

Smoking has been a major public health problem in the world (Fiore et al., 2000), and has been reported as an important risk factor for cardiovascular disease (CVD; American Association of Cardiovascular and Cardiopulmonary Rehabilitation, 2004; Pipe, 1999). Smoking cessation has been highly beneficial for persons suffering from CVD (Critchley & Capewell, 2003; Wilson, Gibson, Willan, & Cook, 2000), yet less than 30% have stopped smoking, despite advice from health care professionals (van Berkel, Boersma, Roos-Hesselink, Erdman, & Simoons, 1999).

Several reports indicate that the exacerbation of a disease motivates individuals to stop smoking (Richmond, 1999), and that the hospital smoke-free environment is an important contributing factor (Rigotti, 2000). Taylor, Houston-Miller, Killen, and DeBusk (1990) reported a 61% smoking cessation rate at 12 months, when patients participated in a nursing inpatient smoking cessation program with telephone follow-up ($p <$ .01) compared with a group of patients hospitalized for an acute myocardial infarction (AMI; 32% smoking cessation). Dornelas, Sampson, Gray, Waters, and Thompson (2000) found a 67% smoking cessation rate at 6 months, compared with 43% in the usual care group, when AMI patients participated in a psychologist-led inpatient intervention with telephone follow-up, based on the stages of change of the Transtheoretical Model (p = .05). This latter intervention was, however, evaluated only in persons having had an AMI. Also, self-reported smoking abstinence was not confirmed by biochemical analyses, and the contribution of the telephone follow-up was not evaluated.

Within an inpatient environment, nurses are the health care professionals who have the most contact with patients. As smoking is prohibited on the wards, hospital

***Maud-Christine Chouinard, PhD, RN**, is an Assistant Professor, Module des sciences infirmières et de la santé, Université du Québec à Chicoutimi, Québec, Canada.*

***Sylvie Robichaud-Ekstrand, PhD, RN**, is an Associate Professor, Faculty of Nursing, Université de Montréal, Québec, Canada.*

environments become ideal settings for individuals to stop smoking and to gain the appropriate skills needed to remain nonsmokers after discharge (Cote, 2000). It is anticipated that once individuals have acquired initial smoking relapse-prevention skills (through participation in an inpatient smoking cessation program), the telephone follow-up by the nurse along with family support may be all that is required to prevent relapse. The readiness to stop smoking, and the level at which the intervention is adapted to participants' characteristics, may contribute to the effectiveness of the intervention (Andersen & Keller, 2002). Introducing such a tailored program may reach a considerable number of patients with CVD within a hospital environment, and become more effective after discharge (Johnson, Budz, Mackay, & Miller, 1999). Also, increased participation rates and improved effectiveness would create a greater impact on smoking cessation at the population level (Abrams et al., 1996). However, several studies led by nurses did not yield the anticipated results (Bolman, de Vries, & van Breukelen, 2002; Hajek, Taylor, & Mills, 2002; Reid et al., 2003). The lack of tailoring smoking cessation programs, the short duration span, and the limited sample size are possible contributing factors.

The controversial results in nurse-led smoking cessation programs and certain methodological issues not considered warrant further investigations (Sebregts, Falger, & Bär, 2000; Wiggers, Smets, de Haes, Peters, & Legemate, 2003). The purpose of this study was to evaluate the effectiveness of a nursing inpatient smoking cessation program with telephone follow-up, according to the Transtheoretical Model. In addition, this study was designed to delineate the effects of the added value of the telephone follow-up.

Theoretical Framework

The study was conceptualized using the Transtheoretical Model (Prochaska & DiClemente, 1983), and the smoking cessation intervention was developed by integrating elements of this model. Because multiple attempts may be necessary to become a nonsmoker, smoking cessation was considered a process rather than an end product (smoker vs. nonsmoker). It is believed that progress to higher levels of change required particular cognitive and behavioral processes of change. The utilization of specific processes of change reflects the individual's readiness to become a nonsmoker. Stage of change is a reflection of this readiness, and can be used to evaluate the effectiveness of a smoking cessation program (Rustin & Tate, 1993). Therefore, the proposed smoking cessation nursing intervention was considered effective if a smoker progressed to further stages of change or quit smoking.

Given that most people do not follow a linear path when modifying a behavior, the Transtheoretical Model is schematically represented as a spiral, which indicates that many attempts may be necessary before modifying and maintaining a healthy behavior. Individuals can regress to a previous stage, learn from it, and eventually reach the maintenance stage. Five stages of change are identified in the Transtheoretical Model (Prochaska, Redding, & Evers, 2002). In the *precontemplation* stage, there is no intention to modify behavior within the next 6 months. *Contemplation* signifies that individuals are becoming aware that smoking is problematic, but still feel ambivalent about quitting. They wish to quit smoking either within the next 6 months or within the next month (if they state never having attempted to quit smoking for at least 24 hr over the past year). *Preparation* is the stage that combines intention and behavioral efforts. Individuals at this stage initiate actions to stop smoking in the next month and back up their intention by having attempted to quit during the past year. *Action* is the 6-month time frame where individuals alter their environment, experiences, and relationships, and stop smoking. However, they are at high risk of relapsing because habits are not yet established. *Maintenance* is the 6-month and over time frame where an individual remains a nonsmoker. It requires motivation and skills to prevent relapse.

A number of scientific articles aimed at health care professionals underline the importance of integrating the information generated by the Transtheoretical Model into smoking cessation programs (Cole, 2001; Cote, 2000; Coward, 1999). Yet, the effects of smoking cessation programs based on this model remain controversial (Andersen, Keller, & McGowan, 1999; Riemsma et al., 2003; Spencer, Pagell, Hallion, & Adams, 2002).

In this study, smoking cessation at 6 months was one desired outcome. More subtle cognitive changes that occur during the normal process of quitting smoking may occur as well (Abrams, 1993; Velicer, Rossi, DiClemente, & Prochaska, 1996). Consequently, progress to further stages of change was chosen as a secondary outcome.

The objective of the study was to test the following hypotheses: Smokers with CVD receiving a nurse-delivered inpatient smoking cessation counseling intervention (based on stages of change) with telephone follow-up (Group 1) or without (Group 2) will present higher point-prevalent smoking abstinence, higher rates of continuous abstinence from smoking, and a better progression to ulterior stages of change at 2 and 6 months after hospital discharge than the usual care group (Group 3). The inpatient smoking cessation counseling intervention with telephone follow-up (Group 1) was expected to produce significantly better results than the inpatient smoking cessation counseling intervention only (Group 2). Point-prevalent smoking abstinence referred to not having smoked for the past 7 days, and obtaining a negative biochemical result at the time of measurement. Continuous smoking abstinence indicated having refrained from smoking since hospital discharge. It was anticipated that the initial stage of change would predict smoking cessation.

Method

Sample

Selection Criteria The following inclusion criteria were required for participation in the study: (a) adult (18 years and older); (b) hospitalized for a CVD (myocardial infarction, angina, heart failure, or peripheral vascular disease); (c) smoker (having smoked at least one cigarette in the past

month); (d) the ability to communicate in French; (e) local resident; (f) a telephone available at home; (g) plan of hospital discharge to home; (h) no mental or physical disabilities that would impede participation.

Sample Size Sample size was determined using the Pass 2000 software. For a chi-square Pearson test, the unilateral proportion differential (δ) was set at 25% for smoking cessation and progress through stages of change between the groups receiving the inpatient counseling with telephone follow-up and the one receiving usual care. With the critical alpha value set at 5% (type I error), and a power ($1 - \beta$) of 80% (type II error), the sample size was established at 52 participants per group.

Procedure

The research protocol and consent form were approved by scientific and ethical committees. At patient admission, medical records were reviewed, and potential participants were identified by verifying medical diagnosis and smoking status. The study was explained to all eligible participants whose condition was stable. If family members were present, the study was explained to them as well. All patients who wished to participate in the study signed a consent form. Data collected during the inpatient period included the following: (a) stages of change, (b) data on nicotine dependence, (c) clinical and sociodemographic data, and (d) level of psychological distress. For comparison purposes (participants vs. nonparticipants), some patients agreed to provide basic clinical and sociodemographic information, and they signed the respective consent form.

A convenience sample of participants was created. To prevent contamination between groups, cluster randomization was used (Hauck, Gilliss, Donner, & Gortner, 1991). This was done by first randomly assigning individuals to predetermined clusters of three to six subjects. The group assignment (inpatient counseling with telephone follow-up, inpatient counseling only, usual care) was then randomly assigned to each of these clusters. Individuals not familiar with the study were in charge of the randomization procedure, which included inserting the information into envelopes that were sealed and would be opened by the investigator only at the time of recruitment.

The experimental groups (inpatient counseling with telephone follow-up; inpatient counseling only) met the two intervention nurses. The duration of each session varied according to the individual's health status and specific needs. The usual care group received general advice on smoking cessation. After discharge, individuals in the inpatient counseling with telephone follow-up group received a total of six phone calls over the next 2 months in the following sequence: two calls during the first week and one call per week over the next 2 weeks, followed by one call every 2 weeks.

A nursing research assistant met each participant at his or her home 2 and 6 months after hospital discharge. Participants completed the same instruments and questionnaires as at baseline. Participants who declared not having smoked over the past week underwent a biochemical validation test.

Smoking Cessation Intervention

The following principles pertaining to the smoking cessation intervention were applied to the experimental groups: (a) the smoking cessation intervention was adapted to each individual's health condition and needs; (b) a significant family member, preferably living with the participant, was involved; (c) an explanation of the stages of change according to the Transtheoretical Model was presented to the participants and to a significant family member; (d) information related to how family members could concretely provide support to the CVD patients was provided (Cohen, 1992); and (e) the importance of remaining a nonsmoker was emphasized by the nurse (Agency for Health Care Policy and Research, 1996).

The inpatient counseling and telephone follow-up was based on the Transtheoretical Model (Prochaska, DiClemente, & Norcross, 1997). During the precontemplation stage, the smoking cessation intervention focused on increasing the perceived cons of smoking (within the decisional balance), and encouraged the use of experiential processes of change (cognitive and affective processes). At the contemplation stage, the intervention aimed at increasing the cons of smoking and diminishing the pros. Experiential, as well as behavioral, processes of change were incorporated (actions undertaken by the smoker). At the preparation stage, four principles were targeted: (a) reversal of the decisional balance (more cons than pros of smoking); (b) the more extensive use of behavioral processes of change; (c) the reinforcement of self-efficacy; and (d) the acquisition of relapse-prevention skills. The action stage focused on increasing the use of behavioral processes, reinforcing self-efficacy, providing relapse-prevention skills, and reinforcing smoking cessation attempts by congratulating the individual for deciding to stop smoking and to remain a nonsmoker. During each telephone interview, the intervention was tailored to the actual stage of change and smoking habits.

The inpatient counseling session lasted 40 min on the average (SD = 8.1), ranging from 10 to 60 min. Family members, spouses in particular (n = 44, 84.6%), accompanied the patients in 46.4% (n = 52) of the interviews. Seventy-five percent of the 56 participants in the inpatient cessation program with telephone follow-up received all six telephone calls. In the other cases, three preferred to interrupt the calls, but desired to continue with the study. As for the other cases, fewer calls were made because the participants were difficult to reach.

Patients who were physically dependent on nicotine, and their physical condition allowed it, were oriented toward pharmacological aids. Therefore, 29 participants used nicotine patches, 6 chewed nicotine gum, and 6 were prescribed bupropion (Zyban®). Significantly more participants in the inpatient counseling with telephone follow-up group used pharmacological aids (n = 22, 39.2%), than the inpatient counseling only (n = 13, 23.2%), and usual care (n = 6, 10.7%) groups ($p < .01$). However, among these, only nine patients (22%) completely followed the 3-month pharmacological treatment. This may indicate that, when followed by the nurse, patients with CVD are better informed about nicotine cessation drug adjuncts. Despite the fact that only 17% (n = 29) of the participants

used nicotine cessation drug adjuncts, cost was not an issue (i.e., these pharmacological aids are covered by a universal medical insurance plan). The main reticence from doctors and patients for using nicotine cessation drug adjuncts was safety and their effectiveness in smoking cessation.

Instruments

Instruments used to gather information related to smoking included Smoking Stages of Change—short form (administered at baseline and at 2 and 6 months); the Fagerström Test for Nicotine Dependence and *l'Indice de détresse psychologique de l'Enquête Santé Québec* (IDPESQ; Quebec Health Survey Psychological Distress Index; completed at baseline). Smoking status was evaluated by self-reports and, if participants declared themselves as being nonsmokers, this was confirmed using biochemical tests. Additional clinical and sociodemographic questionnaires were administered at baseline and at 2 and 6 months.

Stages of Change Stage of change was identified using a French version of the *Smoking: Stage of Change (short form)*. This instrument is composed of four questions, which evaluate the person's intention to quit smoking within a specific time interval, hence identifying the specific stage of change according to the Transtheoretical Model (Figure 1). Because this questionnaire is not a psychological evaluation, no psychometric properties are reported in the literature. Nevertheless, stages of change have predicted smoking cessation or relapse (DiClemente & Prochaska, 1985). When analyzing movement to different stages of change, a score of 1 was given to patients who progressed to higher stages, while those who remained at the same stage, or relapsed to a previous stage, were given a score of 0.

Nicotine Dependence Nicotine dependence was measured using the French version of the *Fagerström Test for Nicotine Dependence* (Heatherton, Kozlowski, Frecker, & Fagerström, 1991). The scale comprises six questions. Its sum reflects the severity of physical dependence on nicotine. Scores ranging from 7 to 10 indicate strong nicotine dependence; scores of 4–6 signify a moderate dependence, while those below 4 reflect little dependence. With a Cronbach alpha coefficient of .61, the scale displays moderate internal reliability. This instrument is used extensively in the clinical practice. In this study, its internal reliability was .59.

Psychological Distress The severity of the most prevalent symptoms in depression or anxiety was measured by this 14-item instrument. A provincewide survey in Quebec (Canada) provided sufficient data to establish the psychometric properties of this instrument with regard to construct validity, criterion-related validity, and reliability (Préville, Boyer, Potvin, Perrault, & Legare, 1992). The mean Cronbach alpha coefficient was .89. In this study, Cronbach alpha coefficient was .90.

Smoking Status Self-reports on smoking cessation were validated using a *Home Health Testing*® urinary continence test. This immuno-test detects active smoking elements in the urine if a person has smoked during the previous 4 days. It has a 5% error rate. In the event that some participants conjunctly used a nicotine substitute, smoking status was further validated with a Bedfont carbon monoxide exhalation test, *Smokerlyser*®. In an earlier study, biochemical measures enhanced the validity of the self-reports, especially if the individual was at a high risk of relapsing (Patrick et al., 1994). It is likely that this study represented a similar situation.

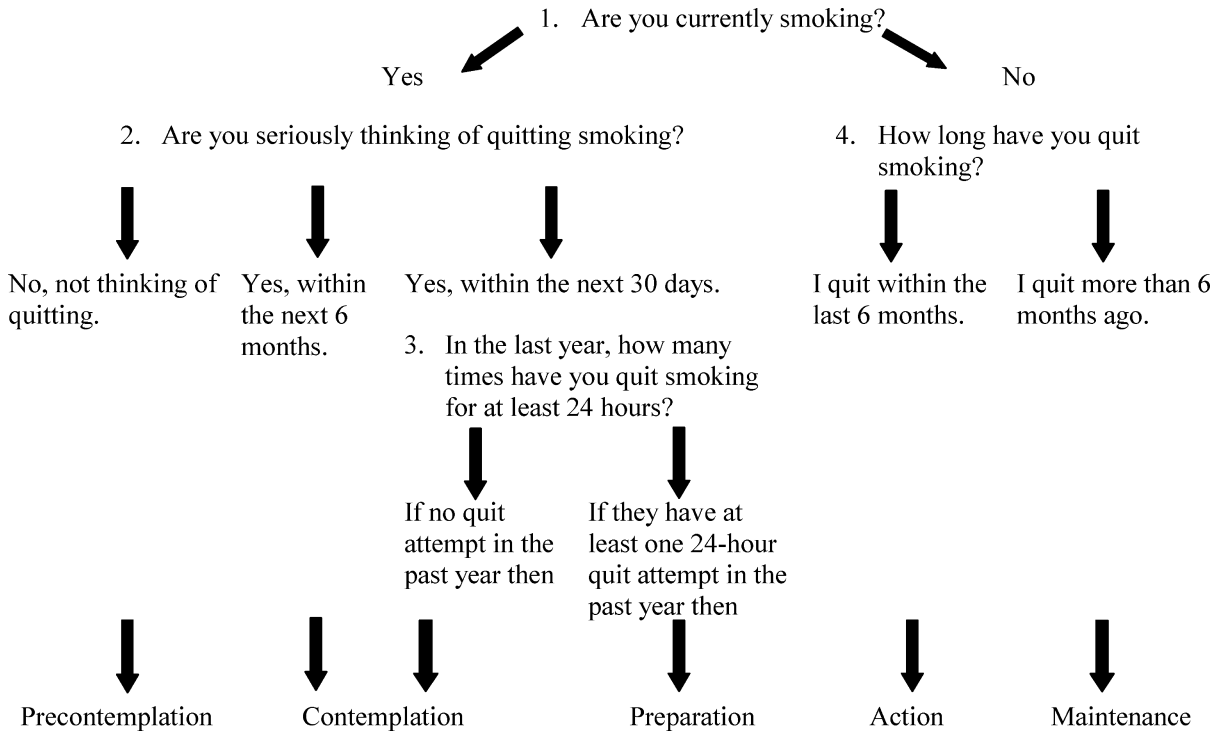

FIGURE 1. Interpretation algorithm of the smoking behavior stages of change scale.

TABLE 1. Characteristics of Participants Versus Nonparticipants (*N* = 225)

	n (%)		
	Participants (*n* = 168)	Nonparticipants (*n* = 57)	*p*[a]
Gender			
Women	45 (26.8)	20 (35.1)	.23
Men	123 (73.2)	37 (64.9)	
Married	124 (73.8)	38 (66.7)	.30
Education (years)			
0–12	131 (78)	53 (93)	.01
13 and more	37 (22)	4 (7)	
Work status			
Employed	60 (35.7)	12 (21.1)	.12
Retired	65 (38.7)	28 (49.1)	
Unemployed	43 (25.6)	17 (29.8)	
Family income[b]			
Below $14,999	29 (18.1)	19 (34.5)	.01
$15,000–$59,999	104 (65.0)	33 (60)	
Above $60,000	27 (16.9)	3 (5.5)	
Principal diagnosis			
Myocardial infarction	40 (23.8)	11 (19.3)	.37
Angina	61 (36.3)	26 (45.6)	
Heart failure	11 (6.5)	1 (1.8)	
Peripheral vascular disease	56 (33.3)	19 (33.3)	
Previous quit attempt	141 (83.9)	44 (77.2)	.25
Medical advice	124 (73.8)	38 (66.7)	.30
Stage of change			
Precontemplation	20 (11.9)	18 (31.6)	.01
Contemplation	18 (10.7)	4 (7)	
Preparation	121 (72)	30 (52.6)	
Action	9 (5.4)	5 (8.8)	
	M (*SD*)		
Age	55.9 (10.4)	60.0 (11.7)	.01
Length of stay (days)	7.15 (11.2)	7.72 (10.4)	.74
Age at smoking initiation (years)	15.21 (4.5)	14.14 (5.0)	.05

[a]Group comparisons *t* test for continuous and χ^2 for nominal and categorical variables.
[b]The total number of participants is not always equal to 225 because of refusals to answer.

Data Analysis

Chi-square analyses and analyses of variance (ANOVAs) were utilized to determine if randomization provided equivalent groups (i.e., the participant's sociodemographic and clinical characteristics at baseline) were not significantly different. Similar analyses were used to compare patients who consented to participate in the study, and those who declined but agreed to provide some information.

Smoking cessation rates were calculated using all available follow-up data. It was recorded if participants were lost to follow-up, or discontinued their participation when they restarted smoking. No cluster analyses were performed because of the small number of participants per cohort (3–6 participants). To prevent contamination between groups (i.e., to avoid patients in different groups benefiting from similar smoking cessation information), a probabilistic sampling method was utilized. Contingency tables with 2 × 3 chi-square analyses were used for discrete variables such as point-prevalent smoking abstinence, continuous smoking abstinence, and stage progression at 2 and 6 months. If a significant difference was found between the three groups (inpatient counseling with telephone follow-up, inpatient counseling, usual care), 2 × 2 chi-square analyses were performed.

TABLE 2. Sociodemographic and Clinical Characteristics of Sample at Baseline

	n (%)				
	Inpatient Counseling With Telephone Follow-Up (*n* = 56)	Inpatient Counseling Only (*n* = 56)	Usual Care (*n* = 56)	Total (*N* = 168)	*p*[a]
Gender					
Women	13 (23.2)	11 (19.6)	21 (37.5)	45 (26.8)	.08
Men	43 (76.8)	45 (80.4)	35 (62.5)	123 (73.2)	
Married	40 (71.4)	44 (78.6)	40 (71.4)	124 (73.8)	.61
Education (years)					
0–12	45 (80.4)	41 (73.2)	45 (80.4)	131 (78.0)	.57
13 and more	11 (19.6)	15 (26.8)	11 (19.6)	37 (22.0)	
Work status					
Employed	23 (41.1)	24 (42.9)	13 (23.2)	60 (35.7)	.13
Retired	18 (32.1)	22 (39.3)	25 (44.6)	65 (38.7)	
Unemployed	15 (26.8)	10 (17.9)	18 (32.1)	43 (25.6)	
Family income					
Below $14,999	10 (18.2)	6 (11.1)	13 (25.5)	29 (18.1)	.10
$15,000–$59,999	32 (58.2)	38 (70.4)	34 (66.7)	104 (65.0)	
Above $60,000	13 (23.6)	10 (18.5)	4 (7.8)	27 (16.9)	
Principal diagnosis					
Myocardial infarction	16 (28.6)	12 (21.4)	12 (21.4)	40 (23.8)	.68
Angina	22 (39.3)	22 (39.3)	17 (30.4)	61 (36.3)	
Heart failure	4 (7.1)	3 (5.4)	4 (7.1)	11 (6.5)	
Peripheral vascular disease	14 (25.0)	19 (33.9)	23 (41.1)	56 (33.3)	
	M (*SD*)				
Age	54.0 (10.8)	56.5 (10.3)	57.25 (9.9)	55.9 (10.4)	.22
Length of stay (days)	7.6 (13.1)	7.5 (13.0)	6.4 (6.5)	7.2 (11.2)	.82
Psychological distress	1.50 (0.48)	1.46 (0.45)	1.54 (0.48)	1.50 (0.47)	.67

[a]Group comparisons ANOVA for continuous and χ^2 for categorical variables.

Multiple logistic regression analyses identified the variables that best predicted smoking abstinence and progression to ulterior stages of change. All 21 variables at baseline were entered, including the duration of the inpatient smoking cessation intervention and family member participation (Forward method). Thereafter, significant variables were incorporated into the regression analyses (Enter method).

Results

Participants

The convenience sample was composed of 168 patients with CVD recruited from a cardiology unit, within a regional tertiary hospital in the province of Quebec (Canada). Between December 2001 and August 2002, 1,354 consecutive patients hospitalized for CVD were screened; 267 (19.7%) were identified as smokers (Figure 2).

Data were obtained from persons who declined to fully participate in the study. This information was compared to that of participants (Table 1), and indicated that those who declined to participate were older, less educated, had lower family incomes, and had started smoking at a younger age. Of these participants, more were found at the precontemplation stage (i.e., they did not envision quitting smoking in the next 6 months). Comparative analyses at baseline indicated that participants in all three experimental groups presented similar sociodemographic and clinical characteristics (Table 2), as well as similar smoking characteristics (Table 3).

Validation

At 2 months, 61 individuals stated they were nonsmokers. Biochemical confirmation was obtained in 55 (3 were not tested for reasons related to the investigators, and 3 others

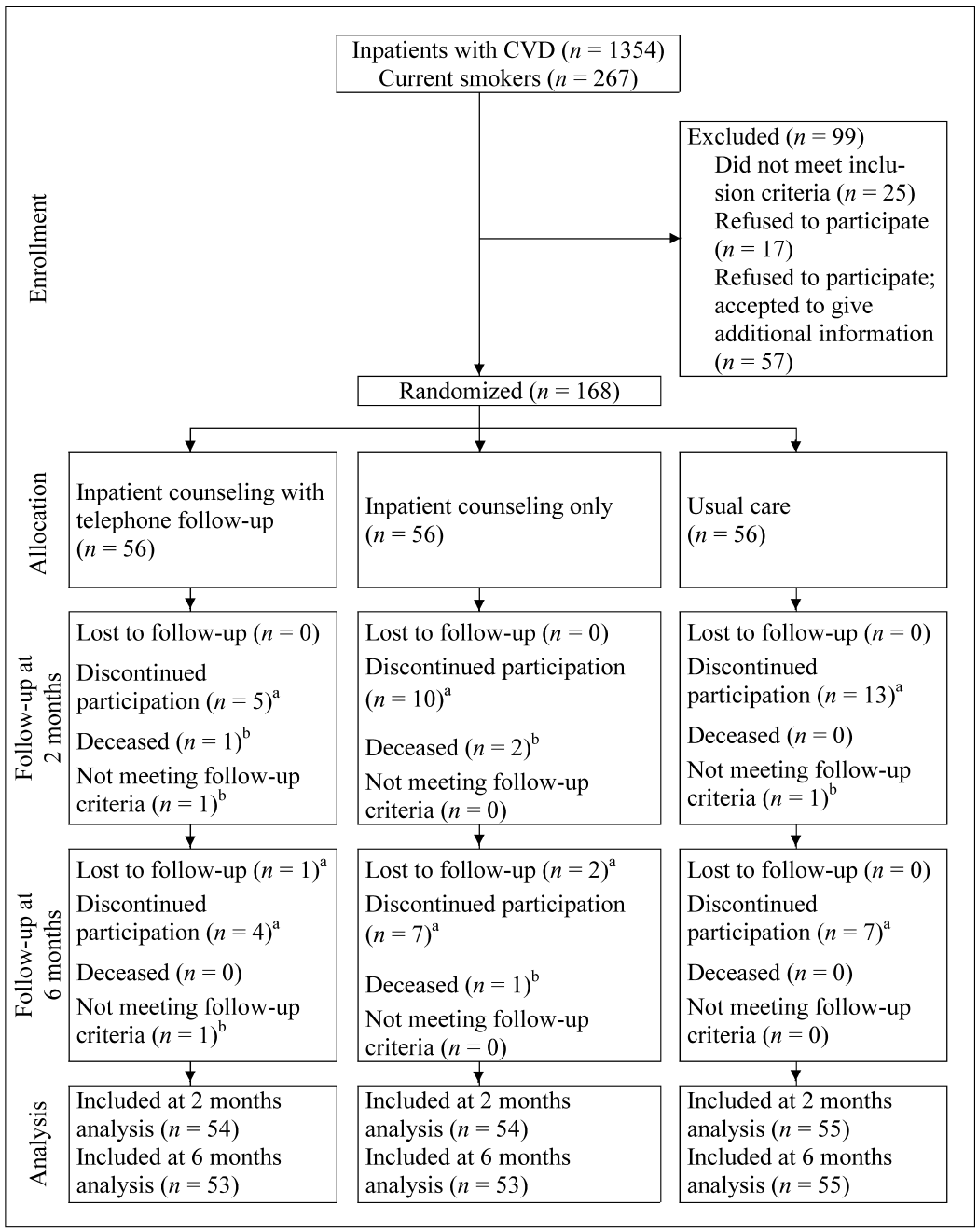

FIGURE 2. Flow chart of participant recruitment and follow-up. CVD = Cardiovascular disease. [a]Included as smokers and [b]excluded from follow-up analysis.

refused to undergo testing and were considered smokers). Of the 55 participants tested, 38 (69.1%) underwent urine tests and presented negative results (confirmed by a negative carbon monoxide test in 51.5%, $n = 20$), and 14 (25.5%) underwent carbon monoxide tests and showed negative results. Finally, 3 persons (5.5%) showed positive results and were reclassified as smokers. At 6 months, 55 individuals declared being nonsmokers; however, 6 of them refused to undergo testing, and were classified as smokers. Of the 49 remaining individuals, 42 (85.7%) had negative results after urine test (and 13 [31%] were confirmed by carbon monoxide testing), 5 (10.2%) underwent carbon monoxide testing with negative results, and 2 individuals were not tested.

Point-Prevalent Smoking Abstinence

At 2 months, individuals in the inpatient counseling with telephone follow-up group significantly abstained from smoking compared with the inpatient counseling and the usual care groups: 44.4% ($n = 24$) compared with 33.3% and 23.6%, respectively, $\chi^2(2, N = 163) = 5.28$; $p < .07$. At 6 months, the difference was slightly higher: 41.5% ($n = 22$), 30.2% ($n = 16$), and 20.0% ($n = 11$) point-prevalent smoking abstinence, in the respective groups, $\chi^2(2, N = 161) = 5.90$; $p < .05$ (Table 4).

Continuous Smoking Abstinence

At 2 months, 42.6% ($n = 23$) of the inpatient counseling with telephone follow-up group quit smoking and

TABLE 3. Smoking Characteristics of Sample at Baseline

	n (%)				
	Inpatient Counseling With Telephone Follow-Up (*n* = 56)	Inpatient Counseling Only (*n* = 56)	Usual Care (*n* = 56)	Total (*N* = 168)	*p*[a]
Previous quit attempt	47 (83.9)	47 (83.9)	47 (83.9)	141 (83.9)	1.00
Medical advice about smoking cessation	47 (83.9)	38 (67.9)	39 (69.6)	124 (73.8)	.11
Stage of change					
Precontemplation	6 (10.7)	5 (8.9)	9 (16.1)	20 (11.9)	.86
Contemplation	5 (8.9)	7 (12.5)	6 (10.7)	18 (10.7)	
Preparation	43 (76.8)	40 (71.4)	38 (67.9)	121 (72.0)	
Action	2 (3.6)	4 (7.1)	3 (5.4)	9 (5.4)	
			M (*SD*)		
Age at smoking initiation	15.8 (5.9)	15.6 (3.6)	15.1 (3.6)	15.5 (4.5)	.74
Addiction	5.6 (2.3)	4.5 (2.8)	5.1 (2.1)	5.1 (2.5)	.07

[a]Group comparisons ANOVA for continuous and χ^2 for categorical and nominal variables.

remained nonsmokers, compared with 29.6% ($n = 16$) in the inpatient counseling group, and 21.8% ($n = 12$) in the usual care group (Table 4). Although this difference appears clinically significant, it is not statistically significant, $\chi^2(2, N = 163) = 5.57$; $p < .06$. At 6 months, the continuous abstinence rate was twice as high in the intervention groups as in the usual care group (24.5%, 24.5%, and 12.7%, respectively), but this difference was still not significant, $\chi^2(2, N = 161) = 3.01$; $p < .21$.

Progression to Ulterior Stages of Change

At 2 months, 48.1% ($n = 26$) of the inpatient counseling with telephone follow-up group progressed to ulterior stages of change, compared to 29.6% ($n = 16$) in the inpatient counseling group, and 27.3% ($n = 15$) in the usual care group, $\chi^2(2, N = 163) = 6.23$; $p < .04$. At 6 months, these differences were greater, and there existed a smaller number in the usual care group having progressed to ulterior stages of change, $\chi^2(2, N = 161) = 8.05$; $p < .02$ (Table 4).

Further data analyses indicate that no precontemplator or contemplator receiving usual care progressed to subsequent stages of change at 6 months, while 25% ($n = 3$) in the inpatient intervention groups did progress, $\chi^2(2, N = 36) = 6.36$; $p = .04$. While no significant difference in the levels of distribution in the stages of change was apparent between groups at 2 months, $\chi^2(6, N = 135) = 9.71$;

TABLE 4. Smoking Cessation Results at 2 and 6 Months

	n (%)				
	Inpatient Counseling With Telephone Follow-Up	Inpatient Counseling Only	Usual Care	χ^2	*p*
Point-prevalent smoking abstinence					
2 months	24 (44.4)	18 (33.3)	13 (23.6)	5.28	.07
6 months	22 (41.5)	16 (30.2)	11 (20.0)	5.90	.05
Continuous smoking abstinence					
2 months	23 (42.6)	16 (29.6)	12 (21.8)	5.57	.06
6 months	13 (24.5)	13 (24.5)	7 (12.7)	3.01	.21
Progress through stages of change					
2 months	26 (48.1)	16 (29.6)	15 (27.3)	6.23	.04
6 months	s23 (43.4)	17 (32.1)	10 (18.2)	8.05	.02

$p = .14$, and 6 months, $\chi^2(8, N = 112) = 13.68$; $p = .09$, none in the inpatient counseling with telephone follow-up group remained or relapsed to the precontemplation stage at 2 or 6 months (Figure 3).

Telephone Follow-Up, an Adjunct to the Inpatient Smoking Counseling Intervention

A significant difference existed between the inpatient counseling with telephone follow-up group and the inpatient counseling only group for progression to ulterior stages of change at 2 months, $\chi^2(1, N = 108) = 3.90$; $p = .05$. However, no significant difference existed between these two groups in point-prevalent smoking abstinence, $\chi^2(1, N = 106) = 1.48$; $p = .22$, and stage progression, $\chi^2(1, N = 106) = 1.45$; $p = .23$, at 6 months.

Baseline Variables as Predictors of Smoking Cessation and Stage Progression at 6 Months

The initial stage of readiness to change was the only 1 of the 21 baseline variables that predicted point-prevalent smoking abstinence at 6 months ($R^2 = .08$; $p = .03$). When the initial stage of change was entered into the regression analysis, followed by group assignment, both variables explained 13% of variance for smoking abstinence at 6 months (Table 5). Furthermore, individuals in the inpatient counseling with telephone follow-up group was 2.75 times more likely to become nonsmokers at 6 months than were individuals who received the usual care. Group assignment was the only factor that predicted progression to ulterior stages of change (Table 5). When initial stage of change and group assignment was forced into the equation, results were comparable to those of abstinence at 6 months, and explained 13% of the variance.

Discussion

In this study, patients with CVD in the nurse-led inpatient smoking cessation program with telephone follow-up group quit smoking at 6 months, significantly more frequently than the inpatient counseling or usual care groups. This 41.5% point-prevalent smoking abstinence rate at 6 months was relatively lower than that observed by Taylor et al. (1990; 61% at 1 year) and Dornelas et al. (2000; 67% at 6 months). As the present study was designed for individuals suffering from all types of CVD (excluding cerebrovascular disease), and not only AMI patients, it is possible that the severity of the disease had played a role on participants' motivation level to quit smoking.

Twice as many participants in the inpatient smoking cessation counseling (with telephone follow-up) group quit smoking compared to those in the usual care group. Inpatient smoking cessation counseling, with or without telephone follow-up, seems to have encouraged more participants to remain nonsmokers in the 6 months following hospital discharge. This also indicates that at least one third (9 of 22) of the patients in the inpatient counseling with telephone follow-up group has relapsed between 2 and 6 months, learned from it, and then become nonsmokers at 6 months. A trend was observed at 2 months for point-prevalent and continuous smoking abstinence, and at 6 months a similar trend was noticed for continuous abstinence. To our knowledge, no other researcher has

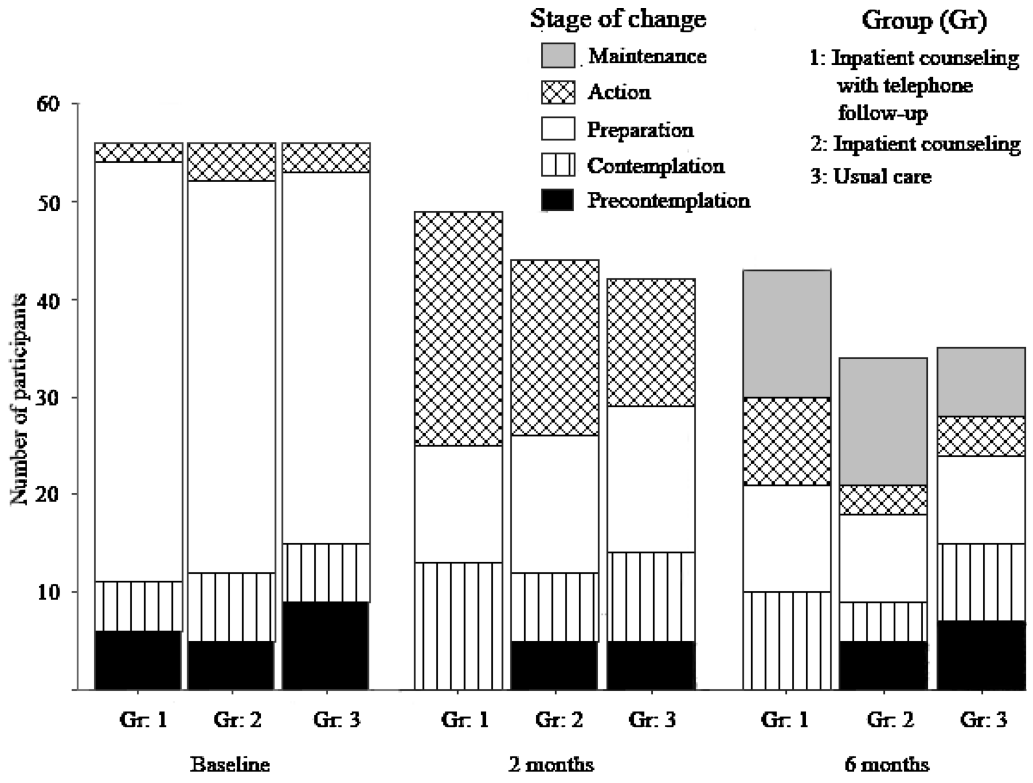

FIGURE 3. Stage of change by group, at baseline, 2 and 6 months posthospital discharge.

TABLE 5. Logistic Regression With the ENTER Method

Variables	Point-Prevalent Smoking Abstinence at 6 Months		Progression in Stages of Change at 6 Months	
	OR	95% CI	*OR*	95% CI
Stage of change at baseline				
Precontemplation[a]	1.00		1.00	
Contemplation	.58	0.05–6.46	2.13	0.25–18.44
Preparation	2.27	0.61–8.40	3.87	0.84–17.97
Action	11.16*	1.69–73.68	11.07*	1.48–82.68
Group assignment				
Usual care[a]	1.00		1.00	
Inpatient counseling with telephone follow-up	2.75*	1.13–6.71	3.32**	1.35–8.17
Inpatient counseling only	1.56	0.62–3.90	1.94	0.77–4.85

Note. *OR* = odds ratio. CI = confidence intervals.
[a]Reference group.
*$p < .05$. **$p < .01$.

studied the effects of such a smoking cessation program in individuals with peripheral vascular disease (Clarke & Aish, 2002; Galvin, Webb, & Hillier, 2001; Power, Brown, & Makin, 1992).

In most smoking cessation studies highly motivated individuals were recruited, but participants were included in this study regardless of their level of motivation or readiness to quit smoking. This might explain the relatively lower smoking abstinence rates (Pierce, Farkas, & Gilpin, 1998). It is important to note that participants who presented lower levels of readiness to quit smoking at baseline progressed more readily to further stages of change. In this study, all participants in the inpatient counseling with telephone follow-up group were at the precontemplation stage at baseline and progressed to ulterior stages of change at 2 or 6 months. While some individuals were still smoking, a few were seriously thinking of quitting within the next 6 months; others were preparing their environment or seeking support from others to help them quit. According to the stages of change made, as participants progressed to ulterior stages of change, their chances of quitting smoking at 6 months after hospital discharge became higher (Prochaska et al., 2002). This was confirmed as stage of change at baseline was predictive of point-prevalent smoking abstinence at 6 months. Similar to the results of the current study, Taylor et al. (1990) found that high intention to quit smoking at hospital discharge predicted smoking cessation at 12 months.

Participation in this study was influenced by the stage of change because 28% of the hospitalized patients who declined to enroll in the study were predominantly at the precontemplation stage. This result was observed also by Clarke and Aish (2002).

It was reported earlier that significant increases in smoking abstinence resulted when inpatient smoking cessation programs included a telephone follow-up (Dornelas et al., 2000; Taylor et al., 1990). In this study, the telephone follow-up was beneficial, particularly for participants who had restarted to smoke after hospital discharge (point-prevalent smoking abstinence vs. continuous abstinence). Thus, telephone follow-up permitted a better progression to ulterior stages of change, which ultimately led to higher smoking cessation rates. It doubled the point-prevalent smoking abstinence rate (21.5% above usual care and 11.3% above inpatient counseling only). These results are supported by Hajek et al. (2002), who obtained no significant results with a short inpatient smoking intervention in individuals with heart disease (MI and angina). This pattern suggests that smokers normally benefit from continuous support from health care professionals after hospital discharge, as smokers go through several attempts before becoming permanent nonsmokers. It also reinforces the logic for representing the Transtheoretical Model as a spiral that refers to the multiple attempts undertaken in behavior modification.

In this study, nurses encouraged family members to participate in the inpatient smoking cessation counseling sessions; however, few family members got involved—the main reason being the short hospitalization stay. Further analyses indicated that family member participation was not a predictor of smoking abstinence or progression to ulterior stages of change. A more intensive and sustained smoking cessation intervention may have influenced social support dispensed by family members. In addition, duration of the inpatient smoking cessation counseling and telephone follow-up was not a predictor. This further suggests that a relatively brief smoking cessation intervention could be as effective.

The results of this study can be generalized only to the French-speaking Canadian population with CVD. Furthermore, as three quarters of the sample were men, the results cannot be generalized to women. Also, despite the effectiveness of the randomized method, contamination between groups could have occurred—for example, during

a rehospitalization period, or participation in a cardiac rehabilitation program. No restriction existed for patients seeking information on smoking cessation once they were discharged from the hospital.

The Transtheoretical Model was useful in tailoring the smoking cessation program according to selected cognitive and behavioral components. Results in this study indicate that this nursing inpatient smoking cessation program, which was tailored to patients' readiness to change, increases point-prevalent smoking abstinence at 6 months. In addition, patients with CVD who are still smoking at 6 months after hospital discharge demonstrate higher levels of motivation to quit smoking in the near future. ▼

Accepted for publication December 14, 2004.

This article was written in conformity with the requirements for the degree of PhD in Nursing Sciences for the first author at the University of Montreal.

Corresponding author: Maud-Christine Chouinard, PhD, RN, Module des sciences infirmières et de la santé, Université du Québec à Chicoutimi, 555, boul. de l'Université, Chicoutimi, Québec, Canada G7H 2B1 (e-mail: maud-christine_chouinard@uqac.ca).

References

Abrams, D. B. (1993). Treatment issues: Toward a stepped-care model. *Tobacco Control, 2*(Suppl.), S17–S29.

Abrams, D. B., Orleans, C. T., Niaura, R. S., Goldstein, M. G., Prochaska, J. O., & Velicer, W. F. (1996). Integrating individual and public health perspectives for treatment of tobacco dependence under managed health care: A combined stepped-care and matching model. *Annals of Behavioral Medicine, 18*(4), 290–304.

Agency for Health Care Policy and Research. (1996). *Smoking cessation.* Rockville, MD: Author.

American Association of Cardiovascular and Cardiopulmonary Rehabilitation. (2004). *Guidelines for cardiac rehabilitation and secondary prevention programs* (4th ed.). Champaign, IL: Human Kinetics.

Andersen, S., & Keller, C. (2002). Examination of the transtheoretical model in current smokers. *Western Journal of Nursing Research, 24*(3), 282–294.

Andersen, S., Keller, C., & McGowan, N. (1999). Smoking cessation: The state of the science. The utility of the Transtheoretical Model in guiding interventions in smoking cessation. *Online Journal of Knowledge Synthesis for Nursing, 6*(9).

Bolman, C., de Vries, H., & van Breukelen, G. (2002). A minimal-contact intervention for cardiac inpatients: Long-term effects on smoking cessation. *Preventive Medicine, 35*(2), 181–192.

Clarke, K. E., & Aish, A. (2002). An exploration of health beliefs and attitudes of smokers with vascular disease who participate in or decline a smoking cessation program. *Journal of Vascular Nursing, 20*(3), 96–105.

Cohen, S. (1992). The content and context of effective spousal support. In J. S. House (Ed.), *Aging, health behaviors, and health outcomes* (pp. 127–134). Hillsdale, NJ: Erlbaum.

Cole, T. K. (2001). Smoking cessation in the hospitalized patient using the transtheoretical model of behavior change. *Heart & Lung, 30*(2), 148–158.

Cote, M. C. (2000). Vascular nurse as a smoking cessation specialist. *Journal of Vascular Nursing, 18*(2), 47–53.

Coward, R. (1999). Using the transtheoretical model in guiding smoking cessation. *Nurse Practitioner: American Journal of Primary Health Care, 24*(2), 146–147, 149–150.

Critchley, J. A., & Capewell, S. (2003). Mortality risk reduction associated with smoking cessation in patients with coronary heart disease: A systematic review. *JAMA, 290*(1), 86–97.

DiClemente, C. C., & Prochaska, J. O. (1985). Processes and stages of self-change: Coping and competence in smoking behavior change. In T. A. Wills (Ed.), *Coping and substance use* (pp. 319–343). New York: Academic Press.

Dornelas, E. A., Sampson, R. A., Gray, J. F., Waters, D., & Thompson, P. D. (2000). A randomized controlled trial of smoking cessation counseling after myocardial infarction. *Preventive Medicine, 30*(4), 261–268.

Fiore, M. C., Bailey, W. C., Cohen, S. J., Dorfman, S. F., Goldstein, M. G., Gritz, E. R., et al. (2000). *Treating tobacco use and dependence: Clinical practice guideline.* Rockville, MD: U.S. Department of Health and Human Services, Public Health Service.

Galvin, K., Webb, C., & Hillier, V. (2001). Assessing the impact of a nurse-led health education intervention for people with peripheral vascular disease who smoke: The use of physiological markers, nicotine dependence and withdrawal. *International Journal of Nursing Studies, 38*(1), 91–105.

Hajek, P., Taylor, T. Z., & Mills, P. (2002). Brief intervention during hospital admission to help patients to give up smoking after myocardial infarction and bypass surgery: Randomised controlled trial. *BMJ, 324*(7329), 87–89.

Hauck, W. W., Gilliss, C. L., Donner, A., & Gortner, S. (1991). Randomization by cluster. *Nursing Research, 40*(6), 356–358.

Heatherton, T. F., Kozlowski, L. T., Frecker, R. C., & Fagerström, K. O. (1991). The Fagerström Test for Nicotine Dependence: A revision of the Fagerström Tolerance Questionnaire. *British Journal of Addiction, 86*(9), 1119–1127.

Johnson, J. L., Budz, B., Mackay, M., & Miller, C. (1999). Evaluation of a nurse-delivered smoking cessation intervention for hospitalized patients with cardiac disease. *Heart & Lung, 28*(1), 55–64.

Patrick, D. L., Cheadle, A., Thompson, D. C., Diehr, P., Koepsell, T., & Kinne, S. (1994). The validity of self-reported smoking: A review and meta-analysis. *American Journal of Public Health, 84*(7), 1086–1093.

Pierce, J. P., Farkas, A. J., & Gilpin, E. A. (1998). Beyond stages of change: The quitting continuum measures progress towards successful smoking cessation. *Addiction, 93*(2), 277–286.

Pipe, A. (1999). Smoking. *Canadian Journal of Cardiology, 15*(Suppl. G), 77G–80G.

Power, L., Brown, N. S., & Makin, G. S. (1992). Unsuccessful outpatient counselling to help patients with peripheral vascular disease to stop smoking. *Annals of the Royal College of Surgeons of England, 74*(1), 31–34.

Préville, M., Boyer, R., Potvin, L., Perrault, C., & Légaré, G. (1992). *La détresse psychologique: Détermination de la fiabilité et de la validité de la mesure utilisée dans l'enquête Santé Québec* (Vol. 7). Montréal, Quebec, Canada: Ministère de la santé et des services sociaux du Québec, Gouvernement du Québec.

Prochaska, J. O., & DiClemente, C. C. (1983). Stages and processes of self-change in smoking: Toward an integrative model of change. *Journal of Consulting and Clinical Psychology, 5,* 390–395.

Prochaska, J. O., DiClemente, C. C., & Norcross, J. C. (1997). In search of how people change: Applications to addictive behaviors. In G. R. VanderBos (Ed.), *Addictive behaviors: Readings on etiology, prevention, and treatment* (pp. 671–696). Washington, DC: American Psychological Association.

Prochaska, J. O., Redding, C. A., & Evers, K. E. (2002). The transtheoretical model and stages of changes. In F. M. Lewis (Ed.), *Health behavior and health education: Theory, research, and practice* (pp. 99–120). San Francisco: Jossey-Bass.

Reid, R., Pipe, A., Higginson, L., Johnson, K., D'Angelo, M. S., Cooke, D., et al. (2003). Stepped care approach to smoking cessation in patients hospitalized for coronary artery disease. *Journal of Cardiopulmonary Rehabilitation, 23*(3), 176–182.

Richmond, R. (1999). Opening the window of opportunity: Encouraging patients to stop smoking. *Heart, 81*(5), 456–458.

Riemsma, R. P., Pattenden, J., Bridle, C., Sowden, A. J., Mather, L., Watt, I. S., et al. (2003). Systematic review of the effectiveness of stage based interventions to promote smoking cessation. *BMJ, 326*(7400), 1175–1177.

Rigotti, N. A. (2000). A smoking cessation program for hospital patients. *Tobacco Control, 9*(Suppl. I), I55–I56.

Rustin, T. A., & Tate, J. C. (1993). Measuring the stages of change in cigarette smokers. *Journal of Substance Abuse Treatment, 10*(2), 209–220.

Sebregts, E. H., Falger, P. R., & Bär, F. W. (2000). Risk factor modification through nonpharmacological interventions in patients with coronary heart disease. *Journal of Psychosomatic Research, 48*(5), 425–441.

Spencer, L., Pagell, F., Hallion, M. E., & Adams, T. B. (2002). Applying the transtheoretical model to tobacco cessation and prevention: A review of literature. *American Journal of Health Promotion, 17*(1), 7–71.

Taylor, C. B., Houston-Miller, N., Killen, J. D., & DeBusk, R. F. (1990). Smoking cessation after acute myocardial infarction: Effects of a nurse-managed intervention. *Annals of Internal Medicine, 113*(2), 118–123.

van Berkel, T. F., Boersma, H., Roos-Hesselink, J. W., Erdman, R. A., & Simoons, M. L. (1999). Impact of smoking cessation and smoking interventions in patients with coronary heart disease. *European Heart Journal, 20*(24), 1773–1782.

Velicer, W. F., Rossi, J. S., DiClemente, C. C., & Prochaska, J. O. (1996). A criterion measurement model for health behavior change. *Addictive Behaviors, 21*(5), 555–584.

Wiggers, L. C., Smets, E. M., de Haes, J. C., Peters, R. J., & Legemate, D. A. (2003). Smoking cessation interventions in cardiovascular patients. *European Journal of Vascular and Endovascular Surgery, 26*(5), 467–475.

Wilson, K., Gibson, N., Willan, A., & Cook, D. (2000). Effect of smoking cessation on mortality after myocardial infarction: Meta-analysis of cohort studies. *Archives of Internal Medicine, 160*(7), 939–944.