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Examining the physiological and psychological impact of smoking cessation on patients with acute myocardial infarction

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EXAMINING THE PHYSIOLOGICAL AND PSYCHOLOGICAL IMPACT OF SMOKING CESSATION ON PATIENTS WITH ACUTE MYOCARDIAL INFARCTION: A COMPARISON OF SMOKERS AND NON-SMOKERS

by

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ABSTRACT

This study examined the physiological and psychological stressors of hospitalized acute myocardial infarction (AMI) patients who abruptly ceased smoking. A cross-sectional survey was conducted on 57 AMI patients (29 smokers and 29 non-smokers) on day two following admission to the coronary care unit. Psychological stress was measured using the Profile of Mood States and the Insomnia Severity Index. Retrospective chart abstraction was conducted to examine the impact of smoking cessation on the physiological outcomes. MANCOVA suggested that after adjusting for age, smokers experienced significantly higher levels of depression, anxiety and anger as compared to the non-smokers. Student *t*-tests and chi-square analyses revealed no differences in length of stay, ischemia and arrhythmia between the two groups. The findings support some propositions of the Transactional Model of Stress and Coping, and offer support for continued assessment and research related to the management of nicotine withdrawal following AMI.

DEDICATION

I am forever grateful to my wonderful husband, Mark, and our beautiful children, Matthew, Michael, Brian and Katie, without whose support, I would not have been able to realize this personal and professional dream.

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"I can do all things through Christ who strengthens me." Philippians 4:13.

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CHAPTER 1

INTRODUCTION

The experience of acute myocardial infarction (AMI) represents a time of stress in terms of both emotional impact and lifestyle change (Fleury & Moore, 1999; Stewart, Davidson, Meade, Hirth, & Makrides, 2000). This is particularly true among hospitalized patients (De Jong, Moser, An, & Misock., 2005; Grace et al., 2005; Mayou et al., 2000). When hospitalized, AMI patients who routinely engage in smoking are unable to utilize tobacco as a possible means of coping. This is problematic for these individuals given that smoking has been reported by post-AMI patients as a means of coping with stressful situations (Bennett, Lowe, Mayfield, & Morgan, 1999). In addition, when smokers cease utilizing tobacco, they experience symptoms of withdrawal, which is also associated with anxiety and depression (Hughes, 1992; Gritz, Carr, & Marcus, 1991). The simultaneous convergence of these events may result in physiological and psychological effects that could be detrimental to hospitalized AMI patients. Therefore, determining the impact of abrupt nicotine withdrawal on this population may provide greater insight into the stress and coping of smoking AMI patients. Furthermore, identification of the stressors and coping strategies utilized by AMI patients may assist clinicians and educators to design and implement evidence-based interventions to assist coping during this uncertain time. Finally, the introduction of early interventions to minimize the effects of nicotine withdrawal and facilitate smoking cessation may reduce associated morbidity and mortality in this patient population.

Significance of the Problem

In Canada, heart disease is not only the number one cause of death, but it represents the most significant burden on the national health care system (Health Canada, 2007). When compared to the rest of the country, the direct and indirect costs associated with the treatment of cardiovascular disease in Ontario are significantly greater than all other Canadian provinces (Public Health Agency of Canada, 2003). Smoking represents a significant risk factor for ischemic heart disease. In fact, smokers are two to three times more likely to die from coronary heart disease (CHD) than non-smokers (American Heart Association, 2005). Statistics reveal that in 1998, 22% of all deaths in Canada were related to smoking (Makomaski Illing & Kaiserman, 2004). Of these smoking-related deaths, ischemic heart disease was the second highest cause of death.

The issue of CHD and smoking is of considerable concern in Windsor-Essex County. In this population, ischemic heart disease is the leading cause of death in men and women (Windsor-Essex County Health Unit, 2003). In fact, the Windsor-Essex County Health Unit reported that among women, the rate of coronary artery disease (CAD) in Windsor is 29% higher than the provincial average, with the rate among men being 28% higher than the provincial average. It also reported that 26% of adult males, 24% of adult females and 33% of teens smoke on a daily basis. VanderKaay and Patterson (2006) suggested that individuals who smoke one pack of cigarettes per day have a two and a half times greater chance of developing CHD than non-smokers. Further, Mehta and Eagle (1998) suggested that smoking increases the risk of an initial cardiac event and doubles the rate of a subsequent infarction.

There is strong clinical evidence suggesting that smoking cessation is probably the single-most powerful lifestyle intervention with regard to the prevention of cardiovascular disease (CVD) (American Heart Association, 2005; European Society of Hypertension, 2003). In fact, it has been suggested that smoking cessation results in a 50% decrease in mortality and morbidity associated with CVD (American Heart Association; Dalal, Evans, & Campbell, 2004; Wilson, Gibson, Willan, & Cook, 2000). Furthermore, quitting smoking reduces the risk of a second heart attack or sudden death by 20 to 50 percent among individuals who have suffered AMI (Critchley & Capewell, 2003; Heart and Stroke Foundation, 2002).

Due to the addictive nature of nicotine, smoking cessation remains a difficult process. The Centers for Disease Control and Prevention (2006) suggested that most individuals engage in two to three attempts, or more, before achieving success. In fact, it has been reported (University of Wisconsin Center for Tobacco Research and Intervention, 2004) that 90% of abrupt smoking cessation attempts are unsuccessful. This is probably due to the fact that the onset of nicotine withdrawal can occur within only a few hours after the last cigarette consumed, with peak symptoms occurring within a few days and lasting up to several weeks (Gritz et al, 1991). These symptoms often include anxiety, stress, irritability, depression, decreased concentration, insomnia, headache and tightness in the chest (Health Canada, 2005; VanderKaay & Patterson, 2006). Interestingly, stress has been cited as a trigger for relapse among those who are attempting to quit smoking (Heart and Stroke Foundation, 2001). Furthermore, studies have suggested that adequate resources such as education, behaviour modification and drug therapy are essential components of successful smoking cessation programs

(American Heart Association, 2005; Heart and Stroke Foundation, 2008; Mallin, 2002; National Cancer Institute, 2006).

Despite knowledge of the physical and psychological stressors associated with smoking cessation, it is a standard practice to impose strict and abrupt smoking cessation restrictions upon patients who are hospitalized for the treatment of AMI. Such a practice is problematic given that studies have suggested a correlation between clinical symptoms of CAD and high levels of life stress (Ariyo et al., 2000; Spence, Barnett, Linden, Ramsden, & Taenzer, 1999). Furthermore, anxiety and depression among newly diagnosed AMI patients is common (Crowne, Runions, Ebbesen, Oldridge & Streiner, 1996; De Jong et al., 2005) and may later predict the occurrence of adverse cardiac events (Carney, Freedland, Eisen, Rich, & Jaffe, 1995; Frasure-Smith, Lesperance, & Talajic, 1993; Grace et al., 2005).

De Jong et al. (2005) suggested that 10 to 26 percent of hospitalized persons with AMI are more anxious than those who have been diagnosed with a psychological disorder. Moser and Dracup (1996) reported that individuals with higher states of anxiety after AMI have a 4.9 times higher incidence of in-hospital complications, such as reinfarction, acute ischemia, sustained ventricular tachycardia, ventricular fibrillation and in-hospital death. In addition to its impact on the physiological outcomes of AMI patients, psychological distress may also interfere with an individual's ability to return to work (Lewin, 1995) and his or her ability to engage in necessary self-care behaviours and lifestyle changes (Lawrence & Lawrence, 1987). In fact, smoking cessation is one lifestyle change is impeded by psychological distress (Brown & Mumford, 1984). That is, individuals who experience increased stress are less likely to succeed in quitting.

Although there is empirical evidence to support the relationship between smoking cessation and stress (Cohen & Lichtenstein, 1990; Parrot, 1992; VanderKaay & Patterson, 2006), little is known about: (a) the impact of abrupt smoking cessation on the stress levels of hospitalized AMI patients, and (b) whether stress resulting from abrupt smoking cessation increases the physical complications experienced by these patients. That is, to date, no studies have examined the psychological and physiological impact of abrupt smoking cessation in hospitalized AMI patients. Such research may aid nurses in minimizing the associated physiological and psychological stress, and in developing interventions to improve coping during the initial stages of the AMI experience. In addition, positive coping with smoking cessation during hospitalization may translate into long-term smoking cessation, which may lead to reduction in morbidity and mortality rates.

Purpose of the Study

The general purpose of this study is to develop a greater understanding of the physiological and psychological stressors of hospitalized AMI patients who abruptly cease smoking. Specifically, the proposed study will (a) compare the psychological indicators of stress between smoking and non-smoking hospitalized AMI patients (b) compare the outcomes of smoking and non-smoking patients with respect to differences in length of stay, cardiac arrhythmia, re-infarction and arrhythmia; and (c) examine the relationship between the psychological indicators of stress and patient outcomes following AMI.

Conceptual Framework

The Transactional Model of Stress and Coping

The Transactional Model of Stress and Coping is a theoretical framework for evaluating how individuals cope with stressful events (Lazarus & Folkman, 1984). According to this framework, stress and coping can impact the psychological well-being, health behaviours, and the physical health of individuals. The theory further asserts that appraisal processes impact emotional responses, and that coping strategies are utilized by individuals in order to reduce negative emotions and maintain positive emotional responses. Key assumptions of this framework will be examined in order to better understand how coping efforts impact adaptation to stress. A modified version of the model is presented in Figure 1 on the subsequent page. Only the concepts which support the relationships being examined are included in the adapted model.

The Appraisal Process

When a person is faced with a stressor, the individual engages in both primary appraisal and secondary appraisal (Lazarus & Folkman, 1984). Primary appraisal refers to the individual's perception of an event as being potentially threatening to personal well-being. When an individual suffers an AMI, he or she may or may not perceive the situation to be threatening. This assessment is dependent upon a number of factors, including the severity of the AMI symptoms and use of defense mechanisms, such as denial. The individual's ability to assess options for coping, or control the outcomes or emotions associated with the stressor is referred to as secondary appraisal. Thus, secondary appraisal may include the ability of an AMI patient to assess available support

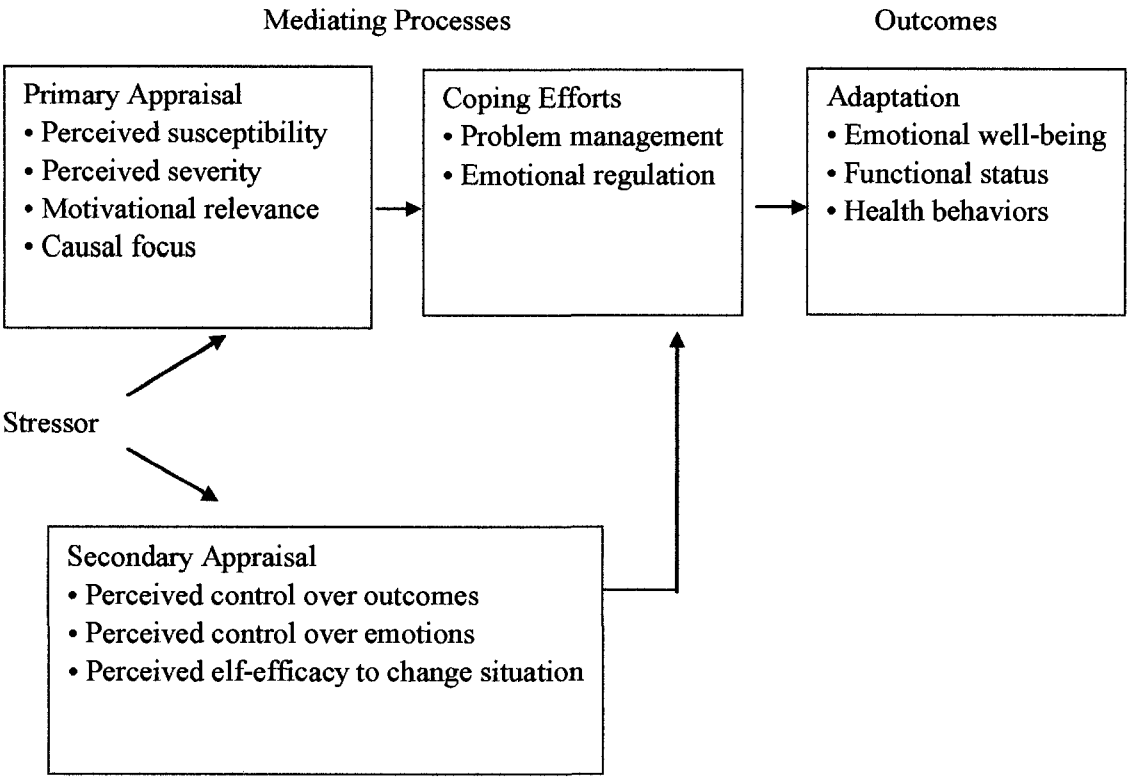

Figure 1. Transactional Model of Stress and Coping, modified (Lazarus & Folkman, 1984)

systems and verbalize the emotions concerning the impact of the event on work, family and/or lifestyle. In the case of a smoker with AMI, the individual generally finds that one of his or her usual coping strategies, smoking, is not an option in the hospital environment.

The primary and secondary appraisal processes combine to determine the emotional response of the individual. For example, stress in the AMI patient is mediated by the individual's lack of ability to change the situation, and his/her perceived ability to manage one's emotions or effectively cope with the situation. Thus, greater emotional distress is expected in a patient who experiences a negative perception of coping options and perceives AMI to be a threat to well-being.

Coping Efforts

According to Lazarus and Folkman (1984), the outcomes of the coping process are influenced by coping efforts, which include both problem-focused strategies and emotion-focused strategies. In order to alter or change a situation to one that is more consistent with personal desires, an individual engages in cognitive efforts that are problem-focused. Also known as problem management strategies, these problem-focused efforts may include active problem solving and information seeking. Conversely, emotion-focused efforts involve processes to minimize the stressful nature of the situation. These efforts may involve redirecting attention away from the distressing elements of the situation, or by re-interpreting the situation in a novel or more favourable manner. According to Lazarus and Folkman, the problem-focused strategies which are characterized as being positive, active and expressive, result in significantly higher levels of functioning and psychological well-being. These authors further assert that emotion-

focused coping strategies are used most often when the stressor is unchangeable. Emotion-focused coping strategies may include efforts such as avoidance, denial, social support, and venting of feelings.

Outcomes

An individual's adaptation to a stressor is measured in terms of coping outcomes (Lazarus & Folkman, 1984). These outcomes are manifested following initial appraisal of the situation (primary appraisal) and an assessment of available resources (secondary appraisal). Both of these processes are influenced by emotion-focused and problem-focused coping efforts. Coping outcomes may be categorized as emotional well-being, functional status and health behaviours. Lazarus and Folkman define functional status as including concepts such as health status, physical limitations and disease progression.

For the purpose of this study, the impact of loss of usual coping strategies (i.e. smoking) on the stress and adaptation of the individual will be examined. An illustrative representation of the relationships among the concepts of interest is presented in Figure 2 on the subsequent page. Given the fact that individuals have reported smoking as a means of coping or diverting attention from stressful situations (Bennett et al., 1999), this study proposes that smoking can be considered an emotion-focused coping effort. Among hospitalized AMI patients, smoking is not an available emotion-focused strategy, and AMI is not a changeable stressor. Furthermore, when abrupt smoking cessation is imposed upon an AMI patient, the symptoms of nicotine withdrawal represent additional stressors. A patient's adaptation to the stress associated with the AMI and abrupt smoking withdrawal is represented by coping outcomes. These outcomes include indicators of emotional well-being, such as measures of mood and insomnia. In the AMI patient,

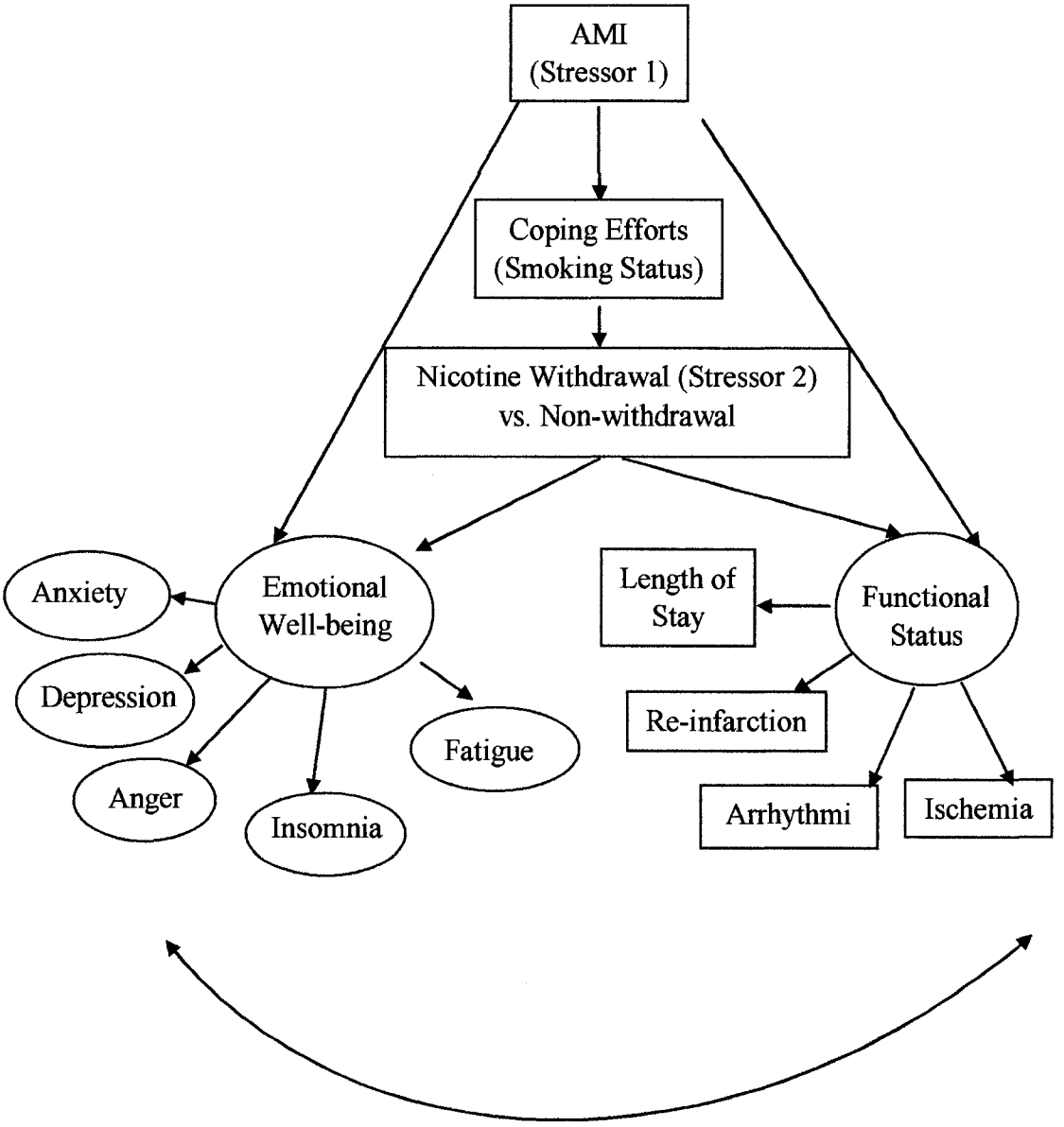

Figure 2. Study Application of the Transactional Model of Stress and Coping

functional status may be manifested through physical outcomes, such as length of stay, angina, arrhythmia or re-infarction. Thus, when applied to this patient population, the Transactional Model of Stress and Coping (Lazarus & Folkman, 1984) suggests that smokers will experience greater distress than those who do not smoke. That is because, unlike non-smokers, smokers are unable to utilize smoking as an emotion-focused coping strategy. The model further predicts that there will be a difference in the measures of functional status between smokers and non-smokers. In addition, the framework suggests that the coping outcomes may interact with one another. That is, there is a relationship between emotional well-being and functional status. Therefore, when applied to this population, this study posits that there is a reciprocal relationship between measures of mood and insomnia and functional status of the AMI patient, as measured by length of stay, re-infarction, cardiac ischemia and arrhythmia. The relationship between these concepts is depicted in Figure 2.

Research Questions

1. Is there a difference in the psychological well-being of smoking and non-smoking AMI patients as measured by insomnia, tension/anxiety, depression/dejection and anger/hostility, fatigue/inertia?
2. Is there a difference in the functional outcomes of smoking and non-smoking AMI patients as measured by length of stay, arrhythmia, re-infarction and cardiac ischemia?
3. Is there a correlation between the functional status and psychological well-being of patients following AMI?

Significance for Nursing

The issue of stress and coping among smokers has not been extensively studied in the hospitalized AMI population. In fact, no known studies exist that have sought to understand both the physiological and psychological outcomes of smoking cessation in this population. Therefore, new knowledge may provide significant implications for both research and nursing practice. Recognition of the causes and deleterious effects of psychological distress in AMI patients is essential for the achievement of positive psychological and physiological outcomes. As compared to other health care providers, nurses are in a particularly unique position to assess and implement strategies to decrease stress and enhance positive coping patterns among AMI patients. Given that anxiety, depression and coping patterns are amenable to nursing intervention (Conn, Taylor, & Wiman, 1991), this study may suggest salient interventions for enhancing both the physiological and psychological outcomes of hospitalized AMI patients. Such interventions are anticipated to bring about subsequent reduction in morbidity and mortality, and improvement in post-AMI quality of life. Furthermore, dissemination of the knowledge of the potential negative psychological and physiological outcomes of abrupt nicotine withdrawal during hospitalization following AMI may serve as an impetus for individuals at risk for AMI to engage in smoking cessation prior to the occurrence of negative cardiac events. Consequently, this behaviour change would reflect an important means of promoting primary prevention for cardiovascular disease in at risk populations.

The findings of this study can be utilized to conduct future research studies in this population. Intervention studies utilizing validated smoking cessation strategies may

demonstrate improved coping and successful reductions in both stress and cardiac outcomes in hospitalized AMI patients. Furthermore, successful coping with smoking cessation during hospitalization may translate into long-term smoking cessation, which may lead to subsequent reduction in associated morbidity and mortality rates.

CHAPTER II

REVIEW OF THE LITERATURE

Search Strategy

Research findings presented in this literature review were obtained through a systematic review using five electronic databases: Proquest, Medline, Pubmed, the Cochrane Database of Systematic Reviews and the Cumulative Index of Nursing and Allied Health Literature (CINAHL). In addition, published theses and dissertations were searched. Keywords used in the search process were stress, coping, anxiety, depression, smoking and hospitalization. These keywords systematically searched in varying combinations with the keywords: acute myocardial infarction or heart attack. The keywords were present in the title, abstract, or the text of the article. This approach yielded 15 published peer reviewed articles and one doctoral dissertation. Bibliographies of the research studies obtained from the search process were further scanned for potentially relevant articles. This resulted in 8 articles. An e-mail address of one author obtained via an internet search was utilized to obtain one additional article. Thus, the search process yielded a total of 24 articles and one doctoral dissertation.

The Review

The Physiological and Psychological Impact of Nicotine Withdrawal

A number of studies have suggested that cessation of nicotine consumption impacts the smoker and produces withdrawal symptoms. In cardiac patients, smoking cessation is associated with improved cardiac outcomes (American Heart Association, 2005; Dalal et al., 2004; Wilson et al., 2000). However, abrupt smoking cessation during the initial hospitalization phase of AMI could potentially lead to physical and

psychological stress that could impede these outcomes. The following section summarizes findings specific to this issue.

In a prospective study of 554 unaided quitters, tobacco withdrawal was assessed in order to better understand the nature of withdrawal (Gritz et al., 1991). Data were collected at baseline, 1 week, 1 month, 3 months, 6 months and 12 months. Participants completed a questionnaire that solicited information concerning the degree of nicotine dependence and nature and severity of withdrawal symptoms. The vast majority of abstainers reported experiencing one or more withdrawal symptoms at day 1 (87.0%), day 2 (90.3%) and week 1 (97.5%). Specifically, symptoms of anxiety (44%, 49%, 42%, respectively for days 1, 2 and at week 1) and restlessness (47%, 55%, 47%, respectively for days 1, 2 and week 1) were reported by smokers who remained abstinent. Repeated measures analyses revealed that both the number of symptoms ($F = 5.58$, $p < .01$) and the severity of symptoms ($F = 22.94$, $p < .01$) peaked on day 2.

Hughes (1992) conducted a longitudinal analysis of self-reported and observer-rated signs and symptoms of nicotine withdrawal where 178 respondents who abstained from smoking at two, seven, 14 and 30 day follow-ups were compared to control groups of 56 long-term smokers, 67 current smokers and 61 individuals with no smoking history. Subjects completed self-report questionnaires that solicited information regarding the symptoms and behaviours associated with nicotine withdrawal. Observers were recruited to periodically rate the subject on similar indicators. Scores for anxiety, hunger, irritability, decreased heart rate, depression, difficulty concentrating and restlessness were greater at day 30 than pre-cessation among subjects who remained abstinent. Post hoc tests confirmed that at day two post-cessation, anxiety, difficulty concentrating,

irritability, restlessness, decreased heart rate and hunger differed significantly from baseline. At day seven post-cessation, increase in cigarette craving was associated with an increase in mood symptoms ($r = .34$) and depression ($r = .50$), but no p values were provided. Furthermore, increases in depression were correlated with increases in irritability ($r = .41$) and anxiety ($r = .45$).

VanderKaay and Patterson (2006) assessed the effects of nicotine and nicotine withdrawal on blood pressure and cardiac function during psychological stress. They subjected 46 smokers to stressors (i.e., an arithmetic task and cold), then tested their cardiovascular reactivity. Each participant was tested twice, once while wearing a 21 mg nicotine patch, and once while wearing a placebo patch. When subjected to the arithmetic task during nicotine withdrawal, participants demonstrated greater heart rate reactivity ($t = 2.18, p < .04$), increased systolic blood pressure ($t = 2.19, p < .04$), increases in anxiety ($t = 2.30, p < .03$) and anger ($t = 2.38, p < .03$). Similarly, exposure to cold, while experiencing nicotine withdrawal, resulted in greater heart rate variability ($t = 4.77, p < .0001$) and increased diastolic blood pressure ($t = 3.77, p < .01$).

Tsuda, Steptoe, West, Fieldman and Kirschbaum (1996) examined the impact of smoking and temporary withdrawal on the mood and behavioural performance of 49 individuals who were assigned to three groups: non-smokers ($n = 16$), regular smokers randomized to overnight abstinence ($n = 14$) and regular smokers who smoked 30 minutes prior to testing ($n = 19$). Participants were administered a computerized problem-solving task based on a series of progressively more difficult matrices. Analysis of variance (ANOVA) revealed that the three groups differed in terms of the percentage of problems they correctly solved ($F = 3.13, p = .05$), such that abstainers averaged 91.7%,

while non-smokers averaged 94.3% and recent smokers averaged 96.1%. The authors reported impaired behavioral performance and symptoms of nicotine craving among the abstinent group ($p < .01$). Furthermore, during the three points of data collection, measures of tension and anger were lower in non-smokers than either of the two smoker groups ($p < .01$).

In a retrospective study, Rea et al. (2002) examined the association between smoking status and risk for recurrent coronary events in patients discharged from hospital following AMI. A sample of 2619 subjects who survived an initial AMI was recruited from a health maintenance organization in the United States. Following assessment of smoking status, participants were classified as non-smokers (persons with no smoking history), former smokers (persons who had quit prior to the AMI), quitters (persons who were smoking at the time of the cardiac event and quit after the infarction) and active smokers (persons who smoked at the time of the cardiac event and continued smoking following the AMI). The endpoint of interest was recurrent AMI or coronary death. Statistical analysis revealed that those who quit smoking after the event, but were smoking at the time of the AMI, had a higher hazard ratio than non-smokers ($RR = 1.43$, $^{95\%}$ CI = 1.07-1.93) and those who continued to smoke ($RR = 1.51$, $^{95\%}$ CI = 1.10-2.07). These findings are highly significant to the second research question, which examined how smoking status impacts patient outcomes. It may follow that the stress imposed by abrupt nicotine withdrawal increases the risk for recurrent coronary events, such as re-infarction and cardiac death following AMI.

The Relationship between Stress and AMI

A number of investigators suggested that AMI patients perceived stress to be a significant cause of AMI (Clark, 2003; Condon & McCarthy, 2006; Fukuoka et al., 2004; King, 2002; McKibbin & Wilson, 2001). Among smokers, this is problematic given that the stress, which is perceived to have contributed to the AMI, is compounded by the additional stress of abrupt nicotine withdrawal. The following text discusses research findings related to the physiological and psychological impact of stress following AMI on: (a) cardiac function and outcomes, such as acute ischemia, re-infarction, arrhythmia and death (b) psychological distress and coping; and (c) the subsequent ability to implement self-care activities.

The Physiological and Psychological Impact of Stress

A review of the literature provides evidence that stress following AMI impacts cardiac function and outcomes (i.e., length of stay in CCU, ischemia, re-infarction), psychological distress and coping and the ability to implement self-care activities, including smoking cessation. The results of these studies are summarized in the following text.

Cardiac function and outcomes. Bacon et al. (2006) investigated the effects of mental stress on blood pressure, heart rate and cardiac output on a sample of 72 cardiac patients and found that stress produced significant increases in systolic blood pressure, diastolic blood pressure, heart rate and cardiac output ($F = 55.75$, $F = 21.37$, $F = 104.37$, $F = 54.96$, respectively, all $p < .001$). The validity and reliability of this study may be questioned given the high refusal rate (59%) among those invited to participate.

Moser and Dracup (1996) conducted a prospective study to examine the association between early onset anxiety among AMI patients and subsequent in-hospital complications. The study involved multiple cardiovascular centres who were involved in the Global Utilization of Streptokinase and Tissue Plasminogen Activator for Occluded Coronary Arteries (GUSTO) trial. In total, 86 confirmed AMI patients were recruited. The Brief Symptom Inventory (Derogatis, 1975) was utilized to measure the psychological distress of the participants. The outcome of interest was the occurrence of cardiac complications including acute ischemia, re-infarction, sustained ventricular tachycardia, ventricular fibrillation or in-hospital death. Complications were observed in 19.6% of patients who reported increased anxiety levels as compared to 6% of individuals who reported lower levels of anxiety ($p = .001$). When patients with higher anxiety were compared to those with lower anxiety, chi square analysis suggested that ischemia (11% vs 3%, $p = .02$), re-infarction (4.7% vs 0.0%, $p = .04$) and ventricular fibrillation (7.8% vs 1.5%, $p = .03$) were significantly higher among patients with high anxiety. Multiple logistic regression suggested that anxiety remained a significant predictor of cardiac complications during hospitalization (OR = 4.9, $^{95\%}$ CI = 2.1-12.2, p = .003).

In a 6 year cohort study, Ariyo et al. (2000) examined the association of depression with coronary heart disease and all-cause mortality in older American adults (mean age = 72 years). Measures of depression were gathered at baseline and annually from a sample of 4493 subjects for 6 years or until the incidence of a cardiac-related event or death. The findings suggested that every five point increase in mean depression score was associated with a 15% increased risk of developing CHD in both men and

women ($p = .006$). The hazard ratio for mortality was 1.16 ($p = .006$). Multivariate analysis further revealed that individuals with higher baseline depression scores had a 60% higher risk for mortality ($p = .012$) compared to those with the lowest mean baseline depression scores. After controlling for confounding variables, baseline depression was also a significant predictor of CHD (hazard ratio = 1.4, $p = .032$) and death (hazard ratio = 1.6, $p = 0.012$).

Grace et al. (2005) conducted a longitudinal observational study to examine the relationship between depression during hospitalization for a cardiac event and subsequent all-cause mortality in a sample of 910 patients who were hospitalized with an acute coronary syndrome. Of this initial cohort, 856 were matched to the Canadian Institute of Health Information Discharge Abstract Database. Following this process, 750 subjects were determined to have a valid history of depression responses. Two hundred thirty-five respondents (31.3%) reported elevated depression scores during hospitalization. An additional 105 participants reported symptoms of depression (14.0%). The findings further revealed that 115 participants (15.3%) died within 5 years of hospitalization. After adjusting for confounders, the hazards ratios suggested that depressive symptomatology during hospitalization for acute coronary syndromes significantly (all $p < .001$) predicted mortality at 2 years (1.90), 3 years (1.61), 4 years (1.76), and 5 years (1.53).

Frasure-Smith et al. (1993) conducted a prospective study to examine the association between major depression in patients hospitalized following AMI and cardiac mortality in the first 6 months following discharge. The authors recruited 222 subjects from a Quebec cardiac care facility over an 11 month period. The sample was 78% male. In addition to demographic data and smoking status, information regarding depression

was gathered using a modified version of the National Institute of Mental Health Diagnostic Interview Schedule (DIS). The unadjusted results showed that in the six month period following discharge, 12 patients died of cardiac causes and that depression was as a significant predictor of mortality ($RR = 5.74$, $^{95\%}$ $CI = 4.6\text{-}6.87$, $p = .0006$). After controlling for confounding variables such as left ventricular dysfunction and previous AMI, the aforementioned association remained significant (adjusted hazard ratio = 4.29, $^{95\%}$ $CI = 3.14\text{-}5.44$, $p = .013$).

Subsequent to the above study, Frasure-Smith, Lesperance, Juneau, Talajic and Bourassa (1999) examined the issue of gender differences and the impact of depression on one-year mortality following hospitalization for AMI. The researchers performed secondary analysis on data gathered from previous studies that measured depression symptoms during hospitalization using the Beck Depression Inventory (BDI) (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961). Data from 896 subjects suggested that 47.0% of women ($p < .001$) and 25.6% of men ($p < .001$) had BDI scores ≥ 10, indicating symptoms of mild to moderate depression (women's mean = 11.3 ± 9.3 and men's mean = 7.1 ± 7.1). Furthermore, 8.3% of depressed women and 7.0% of depressed men died of cardiac causes (compared to 2.7% and 2.4% of non-depressed women and men, respectively). Increased BDI scores significantly predicted cardiac mortality in both women ($OR = 3.29$, $^{95\%}$ $CI = 1.02\text{-}10.59$) and men ($OR = 3.05$, $^{95\%}$ $CI = 1.29\text{-}7.17$). After controlling for other predictive factors, depression remained an independent predictor of cardiac mortality ($OR = 3.66$, $^{95\%}$ $CI = 1.68\text{-}7.99$).

Psychological distress and coping. Mayou et al. (2000) examined the association of anxiety and depression following AMI with the incidence of subsequent psychological

distress on a sample of 344 subjects who completed self-report questionnaires during hospitalization, and at three and 12 month intervals. Of this sample, 73% were male. The results suggested that more hospitalized distressed subjects were smokers (55% vs. 29%, $p < .001$). The authors also reported an association between distress during hospitalization and a longer hospital stay, although no supporting data analysis results were provided. Patients who reported higher rates of anxiety and depression during hospitalization continued to report higher mean scores of distress at three months and at one year, as compared to those who were not distressed during hospitalization ($p < .05$). Patients who experienced psychological distress during hospitalization had higher anxiety and depression scores at baseline, three months and one year (means = 14, 10, and 10 respectively) compared to those who were not distressed (means = 6 for all time frames).

Lowe, Norman, and Bennett (2000) conducted a longitudinal study to examine the relationships among coping, emotions and perceived health among initial AMI patients in the first six months following the cardiac event. Use of coping strategies, emotion outcomes and perceived health were measured using the COPE instrument (Carver, Scheier, & Weintraub, 1989), the Global Mood Scale (Denollet, 1993), the short form of the Spielberger Stait-Trait Anxiety Inventory (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983) and the Health Complaints Scale (Denollet, 1994) respectively. During hospitalization, anxiety was positively correlated with avoidant-focused coping ($r = .22, p \leq .05$) and negatively correlated with acceptance-focused coping ($r = -.22, p \leq .05$). Multiple regression confirmed these findings. The coping factors explained 16% of the variance in anxiety ($F = 6.18, p < .001$).

In a cross-sectional study, Chalfont and Bennett (1999) explored the relationship between hardiness and mood following AMI. Three to 12 months following hospital discharge, 59 subjects (all men) completed surveys with measures related to anxiety, depression and hardiness. The Hospital Anxiety and Depression Scale (Zigmond & Snaith, 1983) measured anxiety and depression, while the Personal Views Survey (Maddi & Khoshaba, 1994) was utilized as a measure of hardiness. The data suggested that higher depression and anxiety scores were significantly associated with lower perceived feelings of control ($r = -.036, p < .01$; $r = -.49, p < .00$, respectively).

Among post-myocardial infarction patients in the United Kingdom, measures of mood were predicted by coping strategies; cigarette smoking was cited as a coping strategy to reduce stress (Bennett et al., 1999). Thirty-seven participants described behaviours prior to hospitalization, during hospitalization and three months following discharge. During hospitalization, high levels of anxiety were correlated with the following coping strategies: distraction ($r = 0.290, p < 0.05$), not seeking social support ($r = 0.289, p < 0.05$) and disengagement ($r = 0.326, p < 0.01$). Depression scores in hospital were correlated with the emotion-focused strategies of denial ($r = 0.492, p < 0.01$), venting of emotions ($r = 0.348, p < 0.05$) and disengagement ($r = 0.456, p < 0.01$). Three months following AMI, smoking was negatively correlated with seeking social support ($r = -0.332, p < 0.05$). Hierarchical regression revealed that this last association remained after controlling for confounding variables ($R^2 = 0.319$, $\beta = -0.565$, $t = -2.742, p < 0.05$).

Ability to engage in self-care behaviours. Rose, Conn, and Rodeman (1994) examined the relationship between anxiety during hospitalization for AMI and self-care activities, including smoking cessation. Three months after hospitalization, 62 male AMI

patients ($N = 39$) completed the State-Trait Anxiety Inventory Test (Spielberger et al., 1983) and the Health Behavior Scale (Miller, Wikoff, Garrett, McMahon, & Smith, 1990). The results suggested that individuals who had a higher state of anxiety during the hospitalization period were more likely to report continued smoking behaviours three months after their AMI ($r = -.40, p = .01$).

Conn et al. (1991) examined the relationship between anxiety, depression, quality of life, and performance of suggested self-care behaviours among 94 older AMI survivors. Following multiple regression analysis, depression predicted quality of life ($\beta = -.70, p = .001$), and depression was associated with engagement in smoking ($\beta = -.54, p = .03$).

Stewart et al. (2000) provided a qualitative description of the stressors, coping strategies and social support experienced by AMI survivors ($n = 14$) and their spouses ($n = 14$). The data suggested that stressors included both the emotional impact of the event and lifestyle changes associated with the event. Emotional responses included fear, frustration, irritability, depression and feelings of being overwhelmed. Smoking, as a lifestyle change, was a stressor because it was often externally imposed upon the patient and was a source of conflict for AMI survivors and their spouses. Patients used emotion-focused, problem-focused and relationship-focused strategies to cope with the AMI experience. Examples of these strategies included denial, informational support and active engagement through mutual problem solving, respectively.

Shiffman (1982) conducted a cross-sectional study of ex-smokers who were experiencing a crisis related to relapse in smoking. They examined the coping process in avoiding relapse and the factors that influenced relapse episodes among ex-smokers.

Responses related to a series of open-ended questions revealed that 52% of relapses were precipitated by negative affect (i.e., anxiety, frustration and depression) or stress. Negative affect was perceived by depressed respondents as the precipitating source of the crisis ($x^2 = 4.40, p < .05$).

Smoking Status and Stress

Utilizing a cross-sectional, descriptive design, Kuhn (1996) examined three domains of psychosocial functioning that distinguished between smokers, ex-smokers and non-smokers in hospitalized AMI patients. These domains were: (a) perceived and objective indices of health behaviour, (b) personality and psychopathology; and (c) social adjustment. This represents the only known study which has examined the direct relationship between smoking status and the psychological stress. A convenience sample of 40 patients with a confirmed diagnosis of AMI was recruited from the Ottawa General Hospital. Patients were classified according to smoking status. Depression was measured using the Brief Symptom Inventory (Derogatis, 1975). Following a one-way repeated measures ANCOVA, non-smokers were found to have higher depressive symptomatology scores than ex-smokers and smokers ($F = 3.84, p < .05$).

This study's findings must be interpreted with caution due to two statistical limitations. First, sample size ($N = 40$) might have compromised the statistical power of the study. Second, ANCOVA is not able to detect differences between groups on multiple dimensions. Furthermore, this study was limited by data collection procedures that occurred over an extended period from hospitalization to post-discharge, in which case, control over smoking status was not maintained. Finally, time of data collection was not

consistent with peak withdrawal, which occurs in the first two days following smoking cessation (Gritz et al., 1991; Hughes, 1992).

Summary of the Literature Review

Although very little is known about the relationship between the impact of smoking cessation on the stress and physical outcomes of AMI patients, the critical appraisal of the literature provides persuasive support for this study. It has been reported that AMI is a significant cause of stress (Fleury & Moore, 1999; Stewart et al., 2000) and that stress is an untoward condition in individuals with coronary heart disease (Moser & Dracup, 1996). Several authors reported stress as a perceived cause of AMI (Clark, 2003; Condon & McCarthy, 2006; Fukuoka et al. 2004; King, 2002; McKibbin & Wilson, 2001). This is problematic given that abrupt smoking withdrawal represents additional psychological distress, including anxiety, depression and insomnia (Gritz et al., 1991; Hughes, 1992; Tsuda et al., 1996; VanderKaay & Patterson, 2006). Therefore, smokers may experience increased stress, thus further magnifying the actual and perceived stress response to the AMI. This relationship is concerning given that six quantitative studies reported that mood disturbances, such as anxiety and depression were associated with poorer physiological outcomes (Ariyo et al., 2000; Bacon et al., 2006; Grace at al., 2005; Frasure-Smith et al., 1993; Frasure-Smith et al., 1999; Moser & Dracup). Specifically, mood disturbance was associated with in-hospital complications in one study (Moser & Dracup) and in mortality in five studies (Ariyo et al.; Frasure-Smith et al., 1993; Frasure-Smith et al., 1999).

It is not known if the psychological indicators of stress differ between non-smokers and those who are forced to quit smoking during the early phase of recovery

following AMI. More specifically, it is not clear if the stress of smoking withdrawal has an additive effect on the stress of AMI, thus leading to higher stress levels among smokers as compared to non-smokers. The aforementioned literature review revealed only one study that examined the relationship between smoking status and depression during hospitalization for AMI (Kuhn, 1996). Although this study suggested that smokers had lower depression scores than non-smokers, as previously reported, this study was limited by several factors including: (a) sample size, (b) statistical procedures; and (c) data collection procedures.

The direct impact of abrupt smoking withdrawal on the physical outcomes following AMI is not known. Although the literature suggests an indirect relationship between stress and physical outcomes following AMI (Ariyo et al., 2000; Bacon et al., 2006; Grace at al., 2005; Frasure-Smith et al., 1993; Frasure-Smith et al., 1999; Moser & Dracup, 1996), a direct relationship has not been empirically measured. One study reported a relationship between psychological distress during hospitalization and a longer hospital stay, although no supporting data analysis results were provided (Mayou et al., 2000).

The literature concerning psychological coping and AMI is vast, as is the relationship between smoking and psychological distress. However, there are no studies that have thoroughly examined the relationship between both of these issues. In addition, much of the literature related to stress and AMI to date has been conducted in male populations (Bacon et al., 2005; Chalfont & Bennett, 1999; Condon & McCarthy, 2005; Grace et al., 2005; Frasure-Smith et al., 1993; Fukuoka et al., 2004; Lowe et al., 2000;

Mayou et al., 2000; Rose et al., 1994). As a result, the generalizability of the findings of these studies may be limited.

Furthermore, several authors reported that psychological distress during hospitalization was associated with subsequent maladaptive coping and negative mood states (Bennett et al., 1999; Chalfont & Bennett, 1999; Lowe et al., 2000; Mayou et al., 2000). An additional two studies reported that symptoms of psychological stress were associated with continued smoking behaviours (Conn et al., 1991; Rose et al., 1994). These findings suggest that stress may impact successful cardiac rehabilitation and post-AMI quality of life. Hence, this study provides a novel approach to a significant health issue, which may suggest potential implications for nursing research and practice in both the immediate and rehabilitative period following AMI.

CHAPTER III

METHODS

This chapter discusses the research design, setting and sample, conceptual and operational definitions, inclusion criteria and procedures for protection of human subjects.

Research Design

This study employed a descriptive, cross-sectional design. The psychological impact of smoking cessation among AMI patients was measured via self-report questionnaire. Survey packages were completed by patients in the Coronary Care Unit (CCU) on day two following admission to the hospital with a diagnosis of AMI. In order to examine the impact of abrupt smoking cessation on the functional outcomes of the study participants, retrospective chart reviews of participant health records were conducted following discharge of each subject from the hospital. The research questions and hypotheses were tested via univariate and multivariate analyses, specifically t-tests, Chi-square and multivariate analysis of covariance.

Setting and Sample

Setting

Study participants were recruited from two local hospitals: (a) Hotel Dieu-Grace Hospital in Windsor, Ontario, and (b) Windsor Regional Hospital in Windsor, Ontario. Given that only 14 cases were enrolled after four months, ethics approval was sought to add a third site to the study. Approval was granted, and data collection subsequently began at Chatham-Kent Health Alliance in Chatham, Ontario. The CCU's at each of the two Windsor hospitals were nine-bed units, thus providing a total of 18 beds which were

available for patient recruitment. The CCU at Chatham-Kent Health Alliance was a 10 bed unit. Hence, a total of 28 beds were available for recruitment of study participants. The CCU at Hotel Dieu Grace Hospital consisted primarily of private rooms, therefore providing sufficient privacy and confidentiality for recruitment. A combination of private and semi-private accommodations comprised the design of the CCU's at Windsor Regional Hospital and Chatham-Kent Health Alliance. Given that participants were not asked to verbalize their responses, the presence of curtains was considered sufficient to maintain the privacy and confidentiality of responses.

Sample

A non-probability convenience sample was utilized to obtain subjects from the three research sites. Inclusion criteria was as follows: (a) a clinical diagnosis of AMI documented by elevated cardiac markers in the hospital record; (b) 18 years or older; (c) clinically stable; and (d) able to read and understand English. Patients were excluded from the study if they: (a) had unstable vital signs; (b) were mechanically ventilated; (c) required vasoactive medications other than nitroglycerin; (d) had a history of psychiatric diagnosis (anxiety disorder, depression or other psychiatric illness); and/or (d) engaged in smoking between admission and data collection, or were involved in a smoking cessation program prior to admission.

Given that the findings of this research study are reported as a pilot study, 60 participants, males and females, were recruited over a period of 9 months. Three cases, with incomplete data representing greater than 20% of the survey, were not included in data analysis. In total, 57 cases were entered into the data analysis, 29 of whom were actively smoking prior to hospitalization.

Variable Definitions

AMI and Smoking Status

AMI is defined by a blockage in a heart artery, which results in necrosis of the heart muscle (Glanze, Anderson, & Anderson, 1992). Diagnosis of AMI was confirmed based upon documentation of elevated cardiac markers in the patient's medical record. Given that the physiological and psychological symptoms of smoking withdrawal reach precessation levels by 30 days postcessation (Hughes, 1992), a current smoker was defined as an individual who reported using at least one nicotine product (cigarette, cigar, pipe or chewing tobacco) per day at the time of hospital admission or within one month prior to admission. A non-smoker was defined as an individual who had never smoked, never used a nicotine product, or who had quit at least one month prior to hospital admission. Smoking status was determined via self-report.

Psychological Indicators of Stress

Stress is defined as an individual's cognitive interpretation of potentially stressful events (Lazarus & Folkman, 1984). It involves a relationship between the demands of the environment and the ability to cope with these demands. Anxiety and depression are manifestations of stress. Anxiety is defined as a multidimensional somatic, experiential, and interpersonal phenomenon and may be manifested as a feeling of worry, upset, uncertainty, uneasiness, apprehension, or dread (Glanze et al., 1992). It is manifested by psychomotor manifestations of heightened musculoskeletal tension which may not be overtly observable (McNair, Lorr, & Droppleman, 1992). Depression is conceptually defined as sadness, guilt, emotional isolation, futility and feelings of personal worthlessness (McNair et al.). Furthermore, McNair et al. consider anger and fatigue to

represent symptoms of mood disturbance. Glanze et al. define anger as "a feeling of displeasure, rage, upset, or hostility" (p. 42) and fatigue as "a state of exhaustion or a loss of strength or endurance" (p. 312).

In this study, four subscales of the Profile of Mood States Brief Version (POMS, McNair et al., 1992) were considered to reflect negative mood dimensions, which may be associated with symptoms of nicotine withdrawal. These measures of mood were: (a) tension/anxiety; (b) depression/dejection; (c) anger/hostility; and (d) fatigue/inertia. In the analysis, these dimensions were considered individual measures of mood. The POMS (Appendix A) has been used with many patient populations to assess transient, distinct mood states, including those with myocardial infarction (Oldridge, Streiner, Hoffman, & Guyatt, 1994). The short version is recommended for use when there are patient limitations such as fatigue, (Shacham, 1983) as can occur following AMI. The brief version of the POMS consists of 30 single-word items that measure six dimensions of mood. Responses were rated on a 5-point likert type scale with responses ranging from 0 (*not at all*) to 4 (*extremely*). A total score was computed for each measure of mood, with higher scores reflecting higher levels of the symptom severity. The POMS Brief takes five minutes to complete.

Test-retest reliability coefficients have ranged from $r = 0.65$ to $r = 0.74$ and are considered appropriate for assessing emotional states that are transient and expected to respond to clinical interventions (Peterson & Headen, 1984). McNair et al. (1971) reported internal consistency reliabilities at .90 to .92 for anxiety and .95 for depression and adequate convergent and divergent validity of the subscales of the POMS. In a study with cancer patients, Baker et al. (2002) evaluated the psychometric properties of the

POMS Brief. The internal consistency reliability for the subscales of interest in Baker and colleagues' study ranged from .78 to .91. In the same study, correlations of the short form of the POMS with other psychosocial measures (the Centre for Epidemiological Studies-depression scale (CES-D), the Self-rated Karnofsky Performance scale, the Medical Outcomes Study (MOS SF-20), and the Bradburn Positive and Negative Affect Scales) were examined. The POMS subscale of depression/dejection correlated most highly with the CES-D (0.63) and the negative affect subscales of the Bradburn scale (0.52). The POMS subscale of fatigue/inertia correlated with the CES-D (0.34) and with the negative affect scale (0.34). Similarly, the POMS subscale of tension/anxiety correlated with the CES-D (0.49) and with the negative affect scale (0.56). The subscales of depression/dejection correlated negatively (-0.20) with the MOS SF-20 physical functioning scale and the Self-rated Karnofsky Performance scale. The POMS fatigue/inertia subscale correlated negatively with these two psychosocial measures (0.42; 0.40, respectively) as did the subscale of tension/anxiety (0.08; 0.08, respectively). This pattern of correlations provided support for the convergent and divergent validity of the subscales of the brief version of the POMS.

In order to confirm the reliability and validity of the individual measures of mood with the population of interest, reliability statistics and factor analysis were conducted on the data. Cronbach's alpha scores ranged from .75 (depression/dejection) to .94 (fatigue/inertia). Factor analysis revealed good to excellent loadings on each of the measures of mood (Table 1).

Insomnia is defined as a chronic inability to sleep or to remain asleep through the night and can be caused by a variety of physical and psychological factors (Glanze et al.,

Table 1

Psychometric Testing of the Psychological Indicators of Stress

Mood scale/Items	Factor loadings	Chronbach's α
Anxiety scale		.855*
Nervous	.842	
Anxious	.828	
Tense	.799	
Uneasy	.779	
Shaky	.732	
Depression		.754*
Lonely	.810	
Gloomy	.771	
Discouraged	.690	
Unworthy	.674	
Sad	.598	
Anger		.857*
Bad-tempered	.864	
Grouchy	.836	
Angry	.833	
Annoyed	.764	
Furious	.689	

Mood Scale/Items	Factor loadings	Chronbach's α
Fatigue scale		.936*
Fatigued	.920	
Exhausted	.913	
Weary	.895	
Sluggish	.887	
Worn out	.847	
Insomnia scale		.922**
Difficulty staying asleep	.902	
Interference of sleep problems	.890	
Extent of worry about sleep problems	.841	
Difficulty falling asleep	.821	
Satisfied with sleep	.808	
Problem waking too early	.806	
Noticeability of sleep problems to others	.703	

* denotes reliability of dimensions of POMS Brief
** denotes reliability of the ISI

1992). In this study, insomnia was measured utilizing the Insomnia Severity Index (ISI, Morin, 1993). The ISI is a brief and valid tool, which is sensitive to discrete change, and is designed to assess the patient's perception of his/her insomnia (Bastien, Valliers, & Morin, 2001). The ISI is comprised of seven items that assess the severity of sleep onset and sleep maintenance difficulties, satisfaction with current sleep pattern, interference with daily functioning, noticeability of impairment related to sleep problems, and the degree of stress caused by the sleep problem. Each item is rated on a five-point likert type scale and the total score ranges from 0 to 28, with higher scores implying severe levels of insomnia. Insomnia is categorized as non-clinically significant insomnia (score = 0-7), subthreshold insomnia (score = 8-14), moderately severe insomnia (score = 15-21), and severe insomnia (score = 22-28). Bastien et al. (2001) reported adequate internal consistency ($r = 0.74$). Concurrent validity of the ISI was assessed with Pearson's correlation coefficients by correlating the ISI scores with the sleep efficiency variables obtained from the sleep diary and polysomnography that were also used in the study. The size of the correlations between the ISI insomnia categories (subthreshold, moderately severe, and severe) and sleep efficiency obtained with the sleep diary ranged from 0.32 to 0.55 at baseline and from 0.50 to 0.91 at post-test ($p \leq 0.05$). Correlations of the ISI scores with the sleep efficiency obtained with polysomnography ranged from 0.07 to 0.45 at pre-test and from 0.23 to 0.45 ($p < 0.05$) at post-test.

Table 1 summarizes the psychometric testing of the ISI. Reliability of the instrument was demonstrated through a Chronbach's alpha of .92. In addition, factor analysis revealed good to excellent loadings of all items in the instrument (.70 to .90).

Physiological Outcomes

The physiological outcomes of interest in this study were length of stay, acute cardiac ischemia, cardiac arrhythmia and re-infarction. For the purpose of this study, length of stay was defined as the length of CCU hospitalization and was measured in terms of the number of days from admission to discharge from the CCU. Acute cardiac ischemia refers to inadequate blood supply to the myocardium, which is marked by pain and organ dysfunction (Glanze et al., 1992). Acute ischemia was evidenced by frequency of new onset chest pain for which nitroglycerin or morphine is administered. Measures of this variable were determined through documentation of the administration of either medication in the patient record. Arrhythmia is defined as "any change in the normal pattern of the heart beat" (Glanze et al., p. 60). Cardiac arrhythmias of interest to this study were: (a) sustained ventricular tachycardia requiring pharmacologic or electrical intervention, or (b) ventricular fibrillation. Sustained ventricular tachycardia is defined as a persistent run of premature ventricular contractions with a rate between 120 to 200 beats per minute (Thaler, 1995). Ventricular fibrillation is marked by complete lack of a regular heart beat generating no cardiac output, and EKG tracings which reveal no true QRS complexes (Thaler, 1995). Cardiac arrhythmia was operationalized in terms of the frequency of events, as documented in the patient record. Re-infarction is conceptually defined in terms of whether the patient experienced an extension of the existing AMI or new cardiac necrosis due to a secondary event. A patient was considered to have a re-infarction if documentation in the medical chart confirmed this occurrence.

Data Collection

Prior to data collection, approval of the study protocol was obtained from the

Research Ethics Boards of the University of Windsor, Hotel Dieu-Grace Hospital, Windsor Regional Hospital and Chatham-Kent Health Alliance. In order to explain the study and methodology, the investigator discussed the study with the unit managers and staff of the CCU's prior to the start of this study. Two registered nurses (one employed at Windsor Regional Hospital and one employed at Chatham-Kent Health Alliance) and one nursing student from the University of Windsor were hired and trained to assist with data collection. Given that research has suggested that the number and severity of withdrawal symptoms peaks on day two (Gritz et al., 1991), data were collected by the researcher and/or trained research assistants on the second day following admission to the CCU. Guidelines for recruitment of subjects is described in Appendix C. Patients who met the inclusion criteria were approached by the researcher or research assistant, given a full verbal and written explanation of the study, and were invited to participate. All individuals who agreed to participate in the study provided informed consent, thus indicating their willingness to participate in the study. Granting permission to review medical charts was provided to the researcher by each subject. The subjects' charts were reviewed for documentation of data such as, anginal episodes, arrhythmia and re-infarction (Appendix A). This data was coded to correspond with participant self-reported data. In order to verify clarity of response items and length of time needed for completion, pre-test of the survey was conducted with a sample of five individuals who met the inclusion criteria. As no amendments were required to the protocol, this pre-test data was included in the analysis.

The survey package consisted of a letter from the investigator, a demographic data questionnaire, the POMS Brief and the ISI (Appendix A). The assessment

package was given to the participants on day 2 after admission to the CCU. Upon consenting to participate in the study, the investigator provided participants with verbal instructions concerning the completion of the survey. Participants were also provided the opportunity to review the questionnaires and ask questions. The researcher or research assistant was not present during completion of the questionnaires. Completion time of the survey averaged 10 to 15 minutes. In addition to the questionnaires, each participant was provided with an unmarked envelope in which to seal their completed questionnaires. Completed surveys were returned to the nursing staff, who deposited them in a secured drop-box which was provided on each unit.

Data Screening and Analysis

Data was analyzed using the Statistical Package for the Social Sciences (SPSS) 16.0. A two-tailed alpha of .05 was used to determine the significance of statistical findings. Prior to data analysis, 20% of the data was randomly checked for accuracy of data entry. No errors were found. All collected data were screened for issues with missing data, outliers, multicollinearity, singularity and normality. Univariate statistical procedures included student t-tests, chi-square analysis and Pearson correlation. Multivariate analyses consisted of multivariate analysis of covariance (MANOVA) and multivariate analysis of covariance (MANCOVA). A detailed discussion of the screening and cleaning of data, and testing of assumptions for each of the aforementioned procedures is described in Chapter IV.

Protection of Human Subjects

This study conformed to Tri-Council Standards for the ethical conduct of research. As previously stated, approval for this study was sought from the Research

Ethics Boards of the University of Windsor, Hotel Dieu-Grace Hospital, Windsor Regional Hospital and Chatham-Kent Health Alliance. Participants were selected from those wishing to participate based upon the inclusion and exclusion criteria. Participants were provided copies of the letter of information and informed consent prior to participating in the study (Appendix B). In addition, a copy of the information collected from the participants' charts was attached to the consent. The consent form included information regarding the investigator, purpose of the study, procedures, potential risks and benefits, confidentiality and anonymity. A signed consent form was obtained from each participant. Patients were assured that their decision to participate or not participate did not affect their care in any way. Anonymity of participant response was protected through the use of pre-assigned codes on the data collection sheets that did not disclose the patients' identity. All hard data is, and will continue to be stored in a locked cabinet. This data is accessible only to members of the research team. Electronic data was and is saved in a password protected computer program. The data will be kept on file until 2012. The data may be used for subsequent research studies. Following this date, the hard data will be destroyed by shredding and all electronic data will be permanently deleted.

CHAPTER IV

RESULTS

This chapter summarizes the results of the statistical analyses. A description of the data screening and cleaning process is provided, followed by a summary of sample characteristics. Finally, the analysis associated with each of the three research questions is presented.

Data Screening and Analysis

When the database was screened for missingness, there were missing data on the following items from the psychometric measures of mood: *unworthy, sluggish, furious, uneasy, interference of sleep problems with daily functioning and noticeability of sleep problem to others*. These items had one or two missing values each, yielding a total of 10 missing values. In order to avoid dropping these cases, which would result in a reduction in sample size, thus compromising statistical power (Patrician, 2002), case mean substitution was used to replace these missing values. This involves replacing a missing value with the mean of the remaining items for that case (Raymond, 1986), and is considered appropriate for the imputing ordinal missing values in a psychometric Likert-type scale (El-Masri & Fox-Wasylyshyn, 2005).

As the focus of this study is to determine the impact of smoking cessation on patients with AMI, the variables *non-smoker* (never smoked) and *past-smoker* (quit greater than one month ago) were collapsed together to form the true representation of the variable *non-smoker*. That is, the literature suggests that the physiological and psychological symptoms of withdrawal return to precessation levels 30 days after quitting (Hughes, 1992). In addition, as each of the measures of mood was considered an

individual indicator of stress, the scores from each item were summed to provide the total score on each of the following measures of mood: *anxiety, depression, anger, fatigue* and *insomnia.*

Testing of Assumptions

The univariate statistics used in this study met the following assumptions: absence of outliers, normality and linearity. Screening of univariate outliers was performed using histograms, box plots and z-score statistics with a cut-off of 3.29. Variables were screened for normal distribution using skewness and kurtosis statistics and histograms. Given a small study sample, a critical value of $\pm$ 2.58 was used to evaluate the significance of skewness and kurtosis in this study (Stevens, 1996). In all variables with outliers, return of such values to next highest value plus 1 resulted in a normal distribution of the variable. Histograms and Q-Q plots were used to inspect all continuous variables for linearity. As were no occurrences of re-infarction or ventricular fibrillation, these variables were not included in the statistical analysis. With the exception of the variable, *ventricular tachycardia*, linearity was achieved in all variables which were included in the analysis. Unsuccessful transformation of the variable, *ventricular tachycardia,* resulted in dichotomization of this variable. Tables 2 and 3 summarize the testing, results and treatment of the dependent variables.

The assumptions of MANOVA and MANCOVA include the above, in addition to the necessity to meet homogeneity of covariance matrices. That is, the variances in each of the groups of interest (smokers and non-smokers) are roughly equal. Furthermore, in the case of MANCOVA, the covariate must be a normally distributed continuous

Table 2

Normality Statistics for Psychological Indicators of Stress

Variable	Smoking Status	Raw Data				Treated Data		
		M + SD	Skewness	Kurtosis	Outliers	M + SD	Skewness	Kurtosis
Anxiety	Non-smoker	3.50 ± 3.46	2.20	-0.08	0	No Treatment Required		
	Smoker	5.76 + 3.45	0.45	-0.22	0	No Treatment Required		
Depression	Non-smoker	2.75 ± 3.09	3.04	1.02	2*	2.64 ± 2.79	2.12	-0.15
	Smoker	4.59 ± 3.27	2.96	3.38	1*	4.07 ± 2.15	-1.61	-0.73
Anger	Non-smoker	1.68 ± 2.49	6.59	12.33	1*	1.32 ± 1.39	1.82	-0.78
	Smoker	4.17 ± 3.75	2.86	2.65	1*	4.00 ± 3.27	1.33	0.35
Fatigue	Non-smoker	5.29 ± 5.48	2.96	0.78	3*	4.32 ± 3.57	1.30	-1.03
	Smoker	6.69 ± 5.31	1.68	-0.50	0	No Treatment Required		
Insomnia	Non-smoker	10.18 ± 7.06	0.49	-1.43	0	No Treatment Required		
	Smoker	9.62 ± 7.58	1.46	-0.78	0	No Treatment Required		

* replaced with next highest value +1

Table 3

Normality Statistics for Physiological Indicators of Stress

Variable	Smoking Status	Raw Data				Treated Data		
		M + SD	Skewness	Kurtosis	Outliers	M + SD	Skewness	Kurtosis
Length of Stay	Non-smoker	4.32 ± 1.68	3.11	4.00	1*	4.36 ± 1.68	2.25	1.22
	Smoker	4.38 ± 1.68	1.08	-0.88	0	No Treatment Required		
Ischemia	Non-smoker	4.07 ± 5.55	4.09	3.59	4*	3.43 ± 3.95	2.32	-0.36
	Smoker	2.38 ± 3.07	2.23	-0.37	0	No Treatment Required		
Ventricular Tachycardia	Non-smoker	1.12 ± 2.73	5.90	7.42	5	Variable Dichotomized		
	Smoker	.52 ± 1.53	9.90	26.35	4	Variable Dichotomized		

* replaced with next highest value +1

variable. Homogeneity of variance was tested for all variables through determination of the Levene's statistic. The Levene's test was violated in all of the variables with the exception of the variable *anger*. This was not considered an issue, as interpretation of the results for the statistical tests employed take into account the violation of this test.

Sample Characteristics

Subjects were recruited from three hospitals, two in Windsor, Ontario ($n = 42$) and one in Chatham, Ontario ($n = 18$). Of the 60 patients enrolled, 57 cases were valid for inclusion in the analysis. The three cases that were deleted from the study had missing data which represented greater than 20% of the survey. The mean age of the sample was 58 years (SD $\pm$ 10.47). The majority of patients in the sample were diagnosed with their first AMI ($n = 39$; 86%). Fifty-one percent ($n = 29$) were actively smoking prior to admission to the hospital, and 79.3 % ($n = 23$) of these same participants reported experiencing symptoms of withdrawal. The majority of participants reported their ethnicity as white ($n = 51$; 89.5%), with men comprising 71.9% ($n = 41$) of the sample. The mean CCU length of stay was 4.35 days (SD $\pm$ 1.63), while the mean number of ischemic episodes was 2.89 (SD $\pm$ 3.56). A summary of the sample characteristics is presented in Table 4.

Research Question 1

The first research question examined the difference in the psychological indicators of stress between smoking and non-smoking AMI patients. The dependent variables include measures of tension/anxiety, depression/dejection, anger/hostility, fatigue/inertia and insomnia. Following data cleaning, all of the aforementioned variables were found to be normally distributed. The univariate analysis suggested that there were

Table 4

Sample Characteristics

Variable	Smoking *N* (% total)	Non-smoking *N* (% total)	*N* (% total)
Smoking Status	29 (51.0%)	28 (49.0%)	57 (100%)
Gender			
Male	21 (36.9%)	20 (35.0%)	41 (71.9%)
Female	8 (14.0%)	8 (14.0%)	16 (28.0%)
Marital Status			
Married	14 (24.6%)	16 (28.0%)	30 (52.6%)
Single	5 (8.8%)	4 (7.0%)	9 (15.8%)
Widowed	2 (3.5%)	4 (7.0%)	6 (10.5%)
Divorced/separated	6 (10.5%)	3 (5.3%)	9 (15.8%)
Common law	2 (3.5%)	1 (1.8%)	3 (5.3%)
Ethnicity			
White	26 (45.6%)	25 (43.9%)	51 (89.5%)
Black	1 (3.4%)	0 (0.0%)	1 (1.8%)
Asian	1 (3.4%)	0 (0.0%)	1 (1.8%)
Aboriginal	3 (5.3%)	0 (0.0%)	3 (5.3%)
Other	0 (0.0%)	1 (3.4%)	1 (1.8%)

Variable	Smoking *n* (% total)	Non-smoking *n* (% total)	*N* (% total)
Employment			
Full-time	16 (28.1%)	6 (10.5%)	22 (38.6%)
Part-time	2 (3.5%)	8 (14.0%)	10 (17.5%)
Casual	2 (3.5%)	1 (1.8%)	3 (5.3%)
Unemployed/retired	9 (15.8%)	13 (22.8%)	22 (38.6%)
Education			
High school or less	19 (33.3%)	11 (19.2%)	30 (52.5%)
College	8 (14.0%)	12 (21.1%)	20 (35.1%)
University	2 (3.5%)	3 (5.3%)	5 (8.8%)
Graduate degree	2 (3.5%)	0 (0.0%)	2 (3.5%)
Previous AMI			
Yes	4 (7.0 %)	6 (10.5%)	10 (17.5%)
No	21 (36.9%)	18 (31.5%)	39 (68.4%)
Don't know	4 (7.0%)	4 (7.0%)	8 (14.0%)

significant differences between smokers and non-smokers on the anxiety (t = -2.468; p = .017), depression (t = -2.164; p = .035), and anger (t = -4.046; p = .000). That is, smokers reported significantly higher levels of anxiety, depression, and anger than non-smokers while hospitalized in the CCU following AMI (Table 5).

MANOVA was performed to examine the adjusted difference between smokers and non-smokers on each of the dependent variables. That is, while holding all else constant, MANOVA allows the examination of the mean differences between smokers and non-smokers while taking into account the any correlations that might exist between the outcome variables. In addition to the univariate assumptions, the following assumptions were tested and met prior to analysis: multivariate normal distribution of the dependent variables and multivariate homogeneity of covariance matrices (p value for Box's M = .350). The Levene's test of homogeneity of variance indicated that the two groups had equal variance in all dependent variables ($p > .05$), except for anger ($p < .05$). However, MANOVA is known for its robustness to violation of homoegeneity of variance when the analysis is conducted on equal groups (Tabachnick & Fidell, 1996). Given that MANOVA assumes that the outcome variables be correlated, Pearson correlation was performed in order to determine the correlations between each of the dependent variables. The data suggested that correlations existed among the following variables: *fatigue, depression, anger, insomnia* and *anxiety.* A correlation matrix describing the statistical relationship among the variables is provided in Table 6. Therefore, all of the correlated psychological measures of stress were entered into one MANOVA model.

Table 5

Summary of t-test Comparisons for the Psychological Indicators of Stress

Variable	M ± SD	*t*	*p*
Anxiety			
Non-smoker	3.50 ± 3.46	-2.468	.017
Smoker	5.76 ± 3.45		
Total	3.68 ± 3.28		
Depression			
Non-smoker	2.64 ± 2.79	-2.164	.035
Smoker	4.59 ± 3.27		
Total	4.65 ± 3.61		
Fatigue			
Non-smoker	5.29 ± 5.48	-1.970	.054
Smoker	6.69 + 5.31		
Total	6.00 ± 5.39		
Anger			
Non-smoker	1.32 ± 1.39	-4.046	<.001
Smoker	4.17 ± 3.75		
Total	2.95 ± 3.41		
Insomnia			
Non-smoker	10.18 ± 7.06	.284	.778
Smoker	9.62 ± 7.58		
Total	9.89 ± 7.36		

Table 6

Correlation Matrix of the Relationship Among the Psychological Indicators of Stress

Variable	1	2	3	3	5
1. Fatigue	1				
2. Depression	.623*	1			
3. Anger	.358*	.644*	1		
4. Insomnia	.463*	.193	.209	1	
5. Anxiety	.685*	.781*	.618*	.341*	1

* correlation is significant at $\leq .05$

The findings suggested that after controlling for the correlations among the dependent variables, the levels of depression ($F = 4.07$; $p = .034$), anxiety ($F = 6.09$; p .017), and anger ($F = 8.67$; $p = .005$) of AMI patients were impacted by smoking status. That is, smokers had significantly higher levels of depression (M = 4.59 $\pm$ 3.27), anxiety (M = 5.76 $\pm$ 3.45) and anger (M = 4.17 $\pm$ 3.75) as compared to the non-smokers (means = 2.64 $\pm$ 2.79; 3.50 $\pm$ 3.46; and 1.32 $\pm$ 1.39, respectively). However, there was no overall multivariate difference between smokers and non-smokers ($F = 28.176$; $p = .073$). In addition, the univariate comparisons on depression, anxiety, and anger were identical to those obtained from the unadjusted *t*-test analysis. These results are summarized in Tables 7 and 8.

Multiple analysis of covariance (MANCOVA) was then conducted to determine if there were any covariates influencing the impact of smoking status on each of the dependent variables. Given that only continuous variables can be included as covariates

Table 7

MANOVA Analysis on the Impact of Smoking on the Psychological Indicators of Stress

Variable	M ± SD	*F*	*p*
Anxiety			
Non-smoker	3.50 ± 3.46	4.75	.034
Smoker	5.76 ± 3.45		
Depression			
Non-smoker	2.64 ± 2.79	6.09	.017
Smoker	4.59 ± 3.27		
Anger			
Non-smoker	1.32 ± 1.39	8.67	.005
Smoker	4.17 ± 3.75		
Fatigue			
Non-smoker	5.29 ± 5.48	.96	.330
Smoker	6.69 ± 5.31		
Insomnia			
Non-smoker	10.18 ± 7.06	.081	.778
Smoker	9.62 ± 7.76		

in MANCOVA, univariate analysis was conducted on the continuous variables that conceptually may have had a confounding effect on the psychological indicators of stress. The results of the analysis demonstrated that age was the only potential confounder. As a result, MANCOVA was performed to determine the effect of smoking cessation on each of the measures of mood while adjusting for age. The findings suggested that after

adjusting for age, there was an overall multivariate difference between smokers and non-smokers ($F = 3.128$; $p = .016$). Furthermore, the levels of depression ($F = 4.814$; $p = .033$), anxiety ($F = 7.991$; p .007), and anger ($F = 6.125$; $p = .017$) of AMI patients were impacted by smoking status. That is, smokers had significantly higher levels of depression (M = 4.59 $\pm$ 3.27), anxiety (M = 5.76 $\pm$ 3.45) and anger (M = 4.17 $\pm$ 3.75) as compared to the non-smokers (means = 2.64 $\pm$ 2.79; 3.50 $\pm$ 3.46; and 1.32 $\pm$ 1.39, respectively). These results are summarized in Tables 8 and 9.

Table 8

Multivariate MANCOVA Results for Smoking and Age

Variables		Wilk's λ	*F*	*p*
Dependent Variables	Effects			
Anxiety				
Depression	Smoking	.762	3.128	.016
Anger				
Fatigue	Age (cov.)	.793	2.613	.036
Insomnia				

Table 9

Post-hoc Univariate MANCOVA Comparisons After Adjusting for Age

Effect	M + SD	*F*	*p*
Anxiety			
Non-smoker	3.50 ± 3.46	7.991	.007
Smoker	5.76 ± 3.45		
Depression			
Non-smoker	2.64 ± 2.79	4.814	.033
Smoker	4.59 ± 3.27		
Anger			
Non-smoker	1.32 ± 1.39	6.125	.017
Smoker	4.17 ± 3.75		
Fatigue			
Non-smoker	5.29 ± 5.48	.403	.528
Smoker	6.69 ± 5.31		
Insomnia			
Non-smoker	10.18 ± 7.06	1.099	.299
Smoker	9.62 ± 7.58		

Research Question 2

The second research question was aimed at determining the differences in the functional outcomes of smoking and non-smoking AMI patients following AMI, as measured by length of stay, arrhythmia, re-infarction and cardiac ischemia. As there were no occurrences of re-infarction in the study, statistical analysis was not conducted on this

variable. Furthermore, after exploring the variable *arrythmia*, there were no episodes of ventricular fibrillation in either the smoking or the non-smoking group. Therefore analysis was conducted on the variable *ventricular tachycardia* only.

Student *t*-test comparisons were conducted on the continuous outcome variables (length of stay and cardiac ischemia). Prior to analysis, all assumptions of the statistical test were verified as being met. The data suggested that there were no significant differences between smoking and non-smoking AMI patients with respect to length of stay in the CCU (4.34 and 4.36 days; $t = .028$; $p = .978$) and episodes of cardiac ischemia (2.38 and 3.43 episodes; $t = 1.11$; $p = .272$).

Given that the variable, *ventricular tachycardia* was dichotomized, chi square analysis was conducted to determine if there was a difference in the occurrence of ventricular tachycardia among AMI patients who reported smoking prior to admission and those who reported non-smoking. The data suggested that there was no difference in episodes of ventricular tachycardia among smokers and non-smokers ($\chi^2 = .073$; $p = .786$).

MANOVA was not performed on the physiological indicators of stress because Pearson correlation demonstrated that the variables *length of stay* and *cardiac ischemia* were not correlated ($r = .142$; $p = .293$).

Research Question 3

The third research question examined the relationships between the physiological indicators of stress and the psychological well-being of smokers and non-smokers following AMI. Given that all variables, except for the variable *ventricular tachycardia*, were measured as continuous variables, two statistical tests were conducted. First,

Pearson moment correlation was performed to explore the correlations among the continuous variables: *length of stay, cardiac ischemia, depression, anxiety, anger, fatigue* and *insomnia.* Next, the differences in the psychological indicators of stress between those who experienced ventricular tachycardia versus those who did not were explored through the use of student *t*-tests. Pearson moment correlation revealed that there was only one statistically significant relationship among the psychological and physiological indicators of stress. That is, the variables, *insomnia* and *ischemia* were significantly correlated ($r = .289$; $p = .029$). The correlation matrix in Table 10 displays all correlation coefficients of the explored associations. .

Finally, the results of the *t*-tests suggested that there was no significant difference between those who experienced ventricular tachycardia versus those who did not on any of the psychological measures of mood. That is, depression ($t = .155$; $p = .878$), anxiety ($t = .382$; $p = .704$), anger ($t = -.154$; $p = .878$), fatigue ($t = -.681$; $p = .498$), and insomnia ($t = -.007$; $p = .994$) were not significantly different between the two groups of patients (Table 11).

Table 10

Correlation Matrix Explaining Relationships among the Continuous Outcome Variables

Variable	1	2	3	4	5	6	7
1. Fatigue	1						
2. Depression	.623*	1					
3. Anger	.358*	.644*	1				
4. Insomnia	.463	.193	.209	1			
5. Anxiety	.685*	.781*	.618*	.341*	1		
6. Length of Stay	.254	.101	-.054	.125	.137	1	
7. Ischemia	.246	.031	-.025	.289*	.062	.142	1

* correlation is significant at $\leq .05$

Table 11

T-test Comparisons: Ventricular Tachycardia (Vtach) and Psychological Measures

Variable	M $\pm$ SD	*t*	*p*
Anxiety			
Experienced vtach	4.74 $\pm$ 3.62	.382	.704
Did not experience vtach	4.27 $\pm$ 3.72		
Depression			
Experienced vtach	3.72 $\pm$ 3.28	.155	.878
Did not experience vtach	3.54 $\pm$ 3.47		

Variable	M ± SD	*t*	*p*
Anger			
Experienced vtach	2.91 ± 3.36	-.154	.878
Did not experience vtach	3.09 ± 3.75		
Fatigue			
Experienced vtach	5.76 ± 5.42	-.681	.498
Did not experience vtach	7.00 ± 5.42		
Insomnia			
Experienced vtach	9.89 ± 7.57	-.007	.994
Did not experience vtach	9.91 ± 6.73		

CHAPTER V

DISCUSSION

This chapter presents a discussion of the study results. Each research question will be examined individually, with a focus on: (a) degree of fit with the theoretical framework, and (b) congruence and/or lack of congruence with the existing literature. Implications for nursing research and nursing practice will be provided, followed by limitations of the study. This section will conclude with a summary of the discussion.

Research Question 1

The first research question examined the difference in the psychological indicators of stress between smoking and non-smoking AMI patients. The model adapted for the study (Lazarus & Folkman, 1984) posited that smokers who were unable to use smoking as a coping effort would experience higher levels of stress (as measured by depression, anxiety, anger, fatigue, and insomnia) than non-smokers. Overall, the findings supported this supposition. That is, smokers reported higher levels of depression, anxiety, and anger than non-smokers. This is not surprising given that several researchers reported these mood states to be typical symptoms of nicotine withdrawal (Gritz et al., 1991; Tsuda et al., 1996; VanderKaay & Patterson, 2006). However, there were no differences between smokers and non-smokers with respect to fatigue and insomnia. The outcomes associated with each of the measures of mood are discussed individually in the following text.

The Impact of Smoking Cessation on Anxiety

The findings of this study support those of other previous researchers who reported higher levels of anxiety among individuals who experience abrupt nicotine

withdrawal (Gritz et al., 1991; Hughes, 1992; VanderKaay & Patterson, 2006). In fact, although anxiety was highly correlated with both depression and anger, these patients had higher levels of anxiety even after adjusting for depression and anger. This finding supports the notion that smokers will likely experience increased levels of anxiety when hospitalized for AMI. This may be due to a combination of the physiological effects of nicotine withdrawal and a variety of psychological factors. Current standard of care is to administer anti-anxiety medications to patients who are having difficulty coping with the symptoms of nicotine withdrawal and/or the experience of AMI. Although the use of MANCOVA in this study did not allow for the control of categorical data (covariates can only be continuous variables), it is important to note that more smokers (66%; $n = 19$) received anti-anxiety medications, as compared to non-smokers (46.4%; $n = 13$), lending further support to the study findings.

As previously stated, it is possible that the anxiety experienced by smokers following AMI is also due to psychological factors. For example, the symptoms of anxiety may be exacerbated by fear of ability to successfully quit smoking. In this study, almost 90% ($n = 26$) of smokers indicated definite plans to quit smoking in the next month, yet 93% ($n = 27$) had been unsuccessful in past attempts. In fact, 54% ($n = 15$) reported having had three or more unsuccessful quit attempts in the past. Given that patients have reported smoking as a causal factor in AMI (Clark, 2003; Condon & McCarthy, 2006; Fukuoka et al., 2004; King, 2002; McKibbin & Wilson, 2001), it is therefore likely that past failed attempts may contribute to increased anxiety among smokers who experience AMI. That is, when a smoker identifies smoking as a cause of his/her AMI and reflects upon past unsuccessful quit attempts, these processes may

combine to produce greater stress among this group of smokers than smokers who have not previously attempted to quit smoking. Furthermore, with the exception of enforced smoking cessation, it may be assumed that the stressors associated with AMI are similar for both smokers and non-smokers. These stressors may include fear of death, lifestyle modifications and impact on job and/or family. In the case of a non-smoker, he or she may still be able to utilize his or her usual coping strategies in the CCU environment. However, smokers are unable to rely upon smoking as means of coping, and this may heighten the anxiety associated with the experience of AMI.

The Impact of Smoking Cessation on Depression

The findings of this study suggest that smokers had higher depression scores than non-smokers. These findings are congruent with research literature that suggests depression is a symptom of smoking withdrawal (Hughes, 1992; VanderKaay & Patterson, 2006). In fact, Hughes found a correlation between cigarette craving and depression. More importantly, the results of this study revealed that smokers experienced higher levels of depression, regardless of their levels of anxiety and/or anger. Interestingly, Kuhn (1996) reported a converse relationship between smoking cessation and depression, wherein smokers experienced lower depressive symptomatology than non-smokers following AMI. Kuhn hypothesized that non-smokers were searching for a reason for their AMI, whereas smokers had an identified cause and were therefore less depressed. This hypothesis is yet to be validated in any existing literature. Furthermore, it must be noted that Kuhn's study was limited by two methodological concerns: (a) smaller sample size ($n = 40$); and (b) data collection procedures that occurred over an extended period from hospitalization to post-discharge, in which case, control over smoking status

was not maintained. In addition, time of data collection was not consistent with peak withdrawal, which occurs in the first two days following smoking cessation (Gritz et al., 1991; Hughes, 1992).

As previously suggested, depression among smokers is likely related to the physiological result of nicotine withdrawal and a combination of other psychological factors. Specifically, it is possible that an individual who smokes may experience higher levels of depression due to apprehension and/or worry concerning his/her ability to successfully quit. Although the full impact of these psychological factors on the depression scores of smokers is not known, the methodology and statistical techniques employed in this study likely provide sufficient evidence to support the findings. That is, smokers experienced higher levels of depression and this is most probably due to abrupt smoking cessation. Further research in this area is warranted to fully examine the relationship between smoking cessation and depression in this population.

The Impact of Smoking Cessation on Anger

In this study, smokers reported significantly higher levels of anger than non-smokers. This finding is congruent with those of several researchers who reported an association between anger and smoking status (Hughes 1992; Tsuda et al., 2006; VanderKaay & Patterson, 2006). In particular, these researchers attributed anger to abrupt withdrawal from nicotine. Although smokers in this thesis study were subjected to abrupt smoking cessation, there were likely other factors that also contributed to their increased levels of anger. For example, given that patients have attributed smoking as a causal factor in AMI (Clark, 2003; Condon & McCarthy, 2006; Fukuoka et al., 2004; King, 2002; McKibbin & Wilson, 2001), it is possible that smokers experience resentment

towards their current smoking behaviours. In addition, it may be hypothesized that these feelings of anger are heightened by prior unsuccessful quit attempts.

The Impact of Smoking Cessation on Fatigue

The data suggested no association between fatigue and abrupt nicotine withdrawal, a relationship that has not been investigated in previous research. This finding may be explained by the fact that almost half ($n = 27$) of the study participants received sedation while hospitalized in the CCU. In fact, the results showed that an interesting 55% ($n = 16$) of smokers were sedated as compared to 39% ($n = 11$) of non-smokers. Given that more smokers received sedation as compared to non-smokers, it may follow that if sedation could be held constant, smokers may actually experience more fatigue than non-smokers. Unfortunately, MANCOVA assumptions did not allow for inclusion of this categorical variable as a covariate.

The Impact of Smoking Cessation on Insomnia

Contrary to VanderKaay and Patterson (2006) who reported insomnia as a symptom of nicotine withdrawal, the findings of this study suggested no difference between smokers and non-smokers with regard to their insomnia. Although the theoretical model (Lazarus & Folkman, 1984) proposed that smokers and non-smokers would differ with regard to insomnia, it is likely that this relationship was masked by the administration of sedation. As previously presented, sedation was administered to almost half of the patients in this study (47%; $n = 27$), 60% of whom were smokers.

Research Question 2

The data did not support a difference in the functional outcomes of smokers and non-smokers when hospitalized with AMI. These results do not fit the propositions of

Lazarus and Folkman's (1984) Transactional Model of Stress and Coping. This model suggests that smokers who are unable to use smoking as a coping strategy will experience different functional outcomes as compared to non-smokers. In this study, smokers and non-smokers did not differ with regard to CCU length of stay, episodes of cardiac ischemia, arrhythmia or re-infarction. In fact, no participants experienced either re-infarction or ventricular fibrillation. These findings contradict that of Mayou et al. (2000) who reported a relationship between distress and longer hospital stay. There are a variety of reasons to explain this inconsistency in the findings. First, it is important to note that Mayou and colleagues published no supporting data for this result, and therefore Mayou's findings must be questioned. Second, this study examined length of stay in the CCU only, while Mayou et al. studied the impact of stress on total hospital stay. It is possible that symptoms of distress increase after transfer from the CCU because patients no longer receive the same level of individualized care as provided in the CCU. Thus, the impact of smoking cessation on length of stay may be better measured by total length of hospital stay. Third, length of stay in CCU is likely attributed to additional factors which were not considered in the study. Specifically, bed availability on a telemetry unit often determines when AMI patients are transferred from the CCU. Furthermore, AMI patients often undergo cardiac catheterization, which may delay transfer to a step-down unit.

There are no known studies which have examined the direct impact of smoking cessation on the physiological impact of AMI patients. However, Moser and Dracup (1996) reported that anxiety predicted cardiac complications, such as cardiac ischemia, ventricular fibrillation and re-infarction, among hospitalized AMI patients. These findings were not supported by this study. Nevertheless, it must be noted that Moser and

Dracup's findings represent an indirect relationship between smoking status and functional outcomes. Furthermore, Moser and Dracup's study was conducted on a relatively larger sample ($N = 86$), which may have provided the statistical power required to detect differences between the groups. In addition, it is possible that anxiety levels among participants in this study were not high enough to impact the physical outcomes. This may be explained by the fact that the 56% ($n = 32$) patients in this study received anxiolytics. Data were collected with respect to such medications, however, given that they were categorical variables, they could not be included as a covariate in the analysis. Furthermore, ischemia was measured through administration of either morphine or nitroglycerin on an as needed basis. It is important to note that it is standard practice in a CCU to administer nitroglycerin intravenously to control ischemia in a patient who continues to experience frequent symptoms of angina. Hence, all episodes of cardiac ischemia may not have been accounted for.

Research Question 3

The Transactional Model of Stress and Coping (Lazarus & Folkman, 1984) proposed a relationship between the psychological and physiological indicators of stress. In this study, AMI patients who experienced cardiac ischemia also experienced insomnia. This is likely explained by two presumptions: (a) either these patients were awakened by the discomfort associated with angina; or (b) these patients were troubled by the possibility of experiencing angina, and therefore, experienced sleep disturbances. Although the model proposed a relationship among the remaining variables, there were no other significant relationships between the psychological and functional outcomes. These findings were incongruent with the findings of Moser and Dracup (1996) who

reported a significant relationship between high anxiety levels, ischemia, re-infarction and ventricular fibrillation. However, it is important to note that Moser and Dracup's study was published in 1996 and that the treatment of patients experiencing AMI has progressed since that time. In this study, no participants experienced any episodes of re-infarction or ventricular fibrillation.

Implications

Implications for Nursing Practice

This is a pilot study that was conducted on a relatively small sample. Thus, it is difficult to infer that the findings of this study provide prescription for practice. However, the findings of this study suggest the need for nurses to fully assess and intervene to meet the emotional needs of their AMI patients. Given that psychological distress among AMI patients is associated with mortality (Ariyo et al., 2000; Frasure-Smith et al., 1993; Grace et al., 2005), in-hospital complications (Moser & Dracup, 1996), and subsequent distress (Bennett et al., 1999; Brown & Mumford, 1984; Chalfont and Bennett, 1999; Lowe et al., 2000; Mayou et al., 2000), the importance of reducing psychological stress among AMI patients is essential. More importantly, this study highlights the need for ongoing assessment and treatment of anxiety, depression, and anger among AMI patients who are experiencing nicotine withdrawal symptoms. Although it is common for such patients to receive anti-anxiolytics medications to reduce anxiety, only 65.5% (n = 19) received such medications. This is concerning given that 79.3% (n = 23) of smokers reported experiencing one or more symptoms of nicotine withdrawal. Currently, it is not common for AMI patients to receive nicotine replacement or pharmacological smoking cessation aids in the initial phase following AMI. Thus, it may be useful to recommend that

consideration be made with regard to the efficacy and safety of such aids in this patient population. This is especially important given that high stress may hamper smoking cessation (Brown & Mumford; Rose et al., 1994). Therefore, not intervening may create a cyclical pattern of stress, leading to further stress and the inability to successfully quit, all of which may increase the mortality associated with cardiovascular disease.

Although no physiological complications associated with nicotine withdrawal were found in this study, previous research (Moser & Dracup, 1996) suggests that this relationship exists. This may be attributed to the small sample of this study. Thus, it is important that this association be further investigated, and that diligent assessment of complications among smokers who experience AMI continues.

Implications for Nursing Research

The findings of this study highlight the need for further research related to the impact of abrupt smoking cessation among hospitalized AMI patients. First, replication of this study with a larger sample is important to validate the findings. To better understand the relationship between smoking and length of stay, replication of this study examining the total length of hospitalization from admission to discharge is recommended. Given that only 29% of participants in the study were women, it is difficult to infer any conclusions related to gender differences and smoking cessation following AMI. Therefore, further research is recommended to more fully understand any relationships that might exist.

Although the impact of abrupt nicotine withdrawal on the mood of individuals who smoke is well reported in the literature, less is known about smokers who are hospitalized for AMI. Furthermore, the psychological factors which may enhance the

distress of hospitalized AMI patients who smoke are even less understood. Thus, it is important that further studies examining this relationship be conducted to develop a complete understanding of the impact of smoking cessation on mood. Attention should be given to smoking history, specifically the desire to quit smoking and the number of previous quit attempts. Finally, the results of this study lend support for intervention research to determine the efficacy and appropriateness of smoking cessation aids for smokers who are hospitalized with AMI. Such a study could also examine the longitudinal impact of early intervention on quit success, as well as the mortality of cardiac patients who smoked prior to experiencing AMI.

Implications for Nursing Education

This study offers implications for both the education of nurses and patients. It is prudent that critical care curricula and institutional orientation programs for nurses working with cardiac populations include content related to smoking cessation and AMI. That is, nurses need to recognize the possible impact of abrupt nicotine withdrawal on the psychological and physiological stress of AMI patients. Furthermore, health care professionals require education related to the management of symptoms of nicotine withdrawal in this population.

Regarding patient education, nurses should instruct smokers who are experiencing AMI that symptoms of anxiety, depression, and anger are possible after experiencing a heart attack and that it is essential that patients recognize these symptoms and report them to the health care team. From a health promotion perspective, education concerning the risks associated with nicotine use is paramount. Specifically, this education should include the risk factors associated with mood changes and possible complications that

may occur following AMI. This represents additional information that may inhibit initiation of smoking, or promote smoking cessation among patients prior to experiencing an AMI.

Limitations

Although this study adds to the empirical evidence regarding the impact of smoking cessation on patients who experience AMI, it is not without limitations. These limitations can be summarized by issues related to the following: (a) sample size; (b) statistical restrictions; (c) the observational nature of the study, and (d) recruitment issues. Although the study was pilot in nature, 57 participants is likely not sufficient to provide significant power to detect the full impact of smoking cessation on this population. However, despite the relatively small sample, the findings suggested that smoking cessation has a negative impact of the psychological indicators of stress among AMI patients.

The choice of statistical application limited the testing of possible confounding variables in the relationships. That is, there were several variables for which data was collected that may have possibly confounded the relationships among the variables. Unfortunately, MANCOVA requires that covariates are continuous variables. Therefore, the statistical procedures were unable to control for the possible impact of such variables as, medications, smoking history, cardiac catheterization and previous AMI on the outcome variables. Given the observational nature of the study, no causality could be inferred. In addition, the self report nature of responses introduces a potential for response bias. Finally, the demographic characteristics of the study population may limit the generalizability of the results. Although the intent was to recruit participants from a

variety of racial and socio-economic groups, this study included participants who were primarily Caucasian. This may be attributed to the fact that the inclusion criteria required that participants possess the ability to read and understand English. Therefore, it is possible that this criterion limited the number of subjects from non-traditional ethnic groups who were otherwise eligible to participate. Furthermore, given that the majority of participants were male, the impact of abrupt smoking cessation on females is not fully understood.

Conclusions

The purpose of this study was to develop a better understanding of the impact of abrupt smoking cessation on patients who experience AMI. The findings suggest congruence with some of the relationships between the concepts in the adapted theoretical framework. Overall, smoking status did significantly impact the psychological stress of AMI patients, but did not appear to impact the functional outcomes of this population. In addition, there was only one significant relationship between the psychological and physiological indicators of stress. The discussion addressed the issues related to the significant findings and provided plausible explanations for the non-significant results. This study offers noteworthy implications for theory development, nursing practice, education and research. In light of the limitations of this study, it is recommended that further investigation be conducted.

APPENDIX A

Data Collection Forms

Dear Participant,

This survey is designed to better understand your stress levels after the experience of your heart attack and whether smoking cessation due to hospital admission has an impact on these stress levels. The survey consists of three parts: the Profile of Mood States, and the Insomnia Severity of Index, and a questionnaire that asks information about your health and smoking status. Please follow the instructions that are included at the beginning of each questionnaire and complete them as best fits your experience since being hospitalized. Please note that in this study, smoking refers to the use of any nicotine product, such as cigarettes, cigars, pipes and/or chewing tobacco.

When you have completed all three parts of the survey, please seal all three of your answer sheets in the provided envelope. Once you do that, you may ask one of the nurses in the unit to place the envelope in the secured box that I will make available on the unit. Envelopes deposited in the box will be collected by a member of the research team at a later time.

Thank you for taking the time to participate in this study.

Kathy Pfaff, RN, BScN
Master's Student Investigator
University of Windsor
Faculty of Nursing

Profile of Mood States Brief

Instructions:

Below is a list of words that describe feelings that people have. Please read each word carefully. Then circle the number that best describes how you feel **right now**.

Item #	Item	Not at all	A little	Moderately	Quite a bit	Extremely
1.	Tense	0	1	2	3	4
2.	Angry	0	1	2	3	4
3.	Worn out	0	1	2	3	4
4.	Sad	0	1	2	3	4
5.	Annoyed	0	1	2	3	4
6.	Anxious	0	1	2	3	4

Insomnia Severity Index (ISI)

For each question below, please circle the number corresponding most accurately to your sleep patterns since being in the hospital.

For the first three questions, please rate the **SEVERITY** of your sleep difficulties.

1. Difficulty falling asleep:

None	Mild	Moderate	Severe	Very Severe
0	1	2	3	4

2. Difficulty staying asleep:

None	Mild	Moderate	Severe	Very Severe
0	1	2	3	4

3. Problem waking up too early in the morning:

None	Mild	Moderate	Severe	Very Severe
0	1	2	3	4

4. How **SATISFIED**/dissatisfied are you with your current sleep pattern?

Very Satisfied	Satisfied	Neutral	Dissatisfied	Very Dissatisfied
0	1	2	3	4

5. To what extent do you consider your sleep problem to **INTERFERE** with your daily functioning (e.g., daytime fatigue, ability to function at work/daily chores, concentration, memory, mood).

Not at all Interfering	A Little Interfering	Somewhat Interfering	Much Interfering	Very Much Interfering
0	1	2	3	4

6. How **NOTICEABLE** to others do you think your sleeping problem is in terms of impairing the quality of your life?

Not at all Noticeable	A little Noticeable	Somewhat Noticeable	Much Noticeable	Very Much Noticeable
0	1	2	3	4

7. How **WORRIED**/distressed are you about your current sleep problem?

Not at all	A Little	Somewhat	Much	Very Much
0	1	2	3	4

Demographic and General Information		
1. Please indicate your age _____ years	**2. Gender** ☐ male ☐ female	**3. Ethnicity** ☐ white ☐ black ☐ asian ☐ aboriginal ☐ Hispanic ☐ other

4. Marital Status	**5. Employment Status**	**6. Dependent Children at home**
☐ married ☐ single ☐ widowed ☐ divorced/separated ☐ common-law	☐ full-time ☐ part-time ☐ casual ☐ unemployed	☐ yes ☐ no

7. Education

☐ high school or less ☐ community college/diploma ☐ university degree
☐ graduate degree

8. Current Medical Conditions

☐ high blood pressure ☐ diabetes ☐ stroke ☐ angina (chest pain)
☐ lung disease ☐ cancer ☐ anxiety disorder ☐ depression
☐ heart failure

9. Have you had more than one heart attack?

☐ yes ☐ no ☐ I don't know

***If your answer is no, or you don't know, please skip to question #12**

10. Including this heart attack, how many heart attacks have you had?

☐ two ☐ three ☐ more than three

11. Besides this heart attack, when was your last heart attack?

☐ less than one month ago ☐ 1-6 months ago ☐ 6 months to one year ago

☐ between one year and 5 years ago ☐ greater than 5 years ago

12. Have you ever had angioplasty?

☐ Yes ☐ No ☐ I don't know

13. Have you ever had heart bypass surgery?

☐ Yes ☐ No

14. Do you have a family history of heart disease?

☐ Yes ☐ No ☐ I don't know

15. Have you ever been admitted to hospital before?

☐ Yes ☐ No

If yes, how long ago were you in the hospital?

☐ less than one month ☐ 1-6 months ☐ 6 months to one year

☐ between one year and 5 years ☐ greater than 5 years

How long were you hospitalized?

☐ one day ☐ 2 to 3 days ☐ 4 to 7 days ☐ greater than 7 days

16. Please indicate your current smoking status before this hospitalization.

☐ smoker ☐ non-smoker ☐ past smoker

***If you are a past smoker, please skip to question #23**

***If you have never smoked, please skip to question #25**

17. What do you smoke?

☐ cigarettes ☐ cigars ☐ pipe ☐ chewing tobacco

18. On average, how many nicotine products (i.e. cigarettes, chewing tobacco) do you use in a day?

☐ one ☐ 2 to 3 ☐ 4 to 6 ☐ 7 to 10 ☐ 11 to 20 ☐ greater than 20

19. When did you last use a nicotine product?

☐ 2 days ago ☐ 3 to 6 days ago ☐ 1 to 2 weeks ago

☐ greater than 2 weeks but less than one month ago ☐ one month or more ago

20. Have you ever tried to quit smoking?

☐ Yes ☐ No

If yes, how many times have you tried?

☐ 1 ☐ 2 ☐ 3 ☐ 4 or more

If yes, what strategies did you use to help you quit?

☐ none ☐ nicotine patch ☐ nicotine gum

☐ medications ☐ counseling ☐ support group

21. If still smoking, do you plan to quit smoking?

☐ No, I am not thinking about quitting

☐ I am seriously thinking about quitting in the next 6 months

☐ I have made definite plans to quit in the next month

22. If you have already quit smoking, how long ago did you quit?

☐ less than 1 week ☐ 1 to 4 weeks ☐ 1 month to 6 months

☐ 6 months to 1 year ☐ more than 1 year

What strategies did you use to quit? ☐ none ☐ nicotine gum ☐ nicotine patches ☐ medication ☐ counseling
23. Are you experiencing any of the following withdrawal symptoms since your hospitalization? ☐ irritability ☐ difficulty sleeping ☐ fatigue ☐ difficulty concentrating ☐ headache ☐ dry mouth ☐ tightness in chest ☐ sore throat ☐ cough ☐ none
24. Does your spouse or significant other smoke? ☐ Yes ☐ No

Thank you for your participation.

Chart Data Form
1. CCU Length of Stay Admission date to CCU _____ Discharge date from CCU _____
2. Peak Troponin level_____
3. Vital Signs Blood pressure 1) on admission_____ 2) at data collection_____ Heart rate 1) on admission_____ 2) at data collection_____
4. Cardiac Ischemia Number of events for which nitroglycerin or morphine was administered _____
5. Reinfarction ☐ yes ☐ no
6. Arrhythmia No. of episodes of ventricular tachycardia _____ No. of episodes of ventricular fibrillation _____
7. Medications ☐ sedative ☐ anti-anxiolytic ☐ anti-depressant ☐ beta blocker ☐ ACE inhibitor ☐ Nicotine replacement
8. Cardiac catheterization ☐ yes ☐ no
9. CCU Accommodation ☐ private room ☐ semi-private room

APPENDIX B

Consent/Letter of Information

UNIVERSITY OF
WINDSOR

CONSENT TO PARTICIPATE IN RESEARCH

Title of Study: **Examining the Physiological and Psychological Impact of Smoking Cessation on Patients with Acute Myocardial Infarction (AMI): A Comparison of Smokers and Non-Smokers**

You are asked to participate in a research study conducted by Kathryn Pfaff, a registered nurse who is also a Master's student in Nursing, and her faculty advisor, Dr. Maher El-Masri, from the Faculty of Nursing at the University of Windsor. The findings of this study will be used to partially fulfil the requirements for Kathryn Pfaff's Master's degree.

If you have any questions or concerns about the research, please feel to contact Kathy Pfaff at (XXX) XXX-XXXX or Dr. El-Masri at (519) 253-3000, ext. 2400.

PURPOSE OF THE STUDY

The purpose of this study is to learn more about how smoking withdrawal influences the stress levels of people who have experienced an acute myocardial infarction (heart attack).

PROCEDURES

If you volunteer to participate in this study, we would ask you to do the following things:

1. Report your current smoking status (smoker or non-smoker) to the research team.

2. Complete a 20 minute survey package which will be explained to you by a member of the research team. You will be asked to record your answers on a form. The interview will take place at the hospital 2 days after your admission. The survey package consists to three questionnaires:
   The first asks questions about your stress levels during your hospitalization; the second asks questions about your sleeping patterns; and the third asks questions about your medical and smoking history

3. Agree to allow a member of the research team to gather some information about your medical history from your medical record.

POTENTIAL RISKS AND DISCOMFORTS

The risks associated with participating in this study are minimal. That is, the risks or discomforts are similar to those that a heart patient would experience in the period of time following a heart attack. Because heart patients often experience fatigue or tiredness following a heart attack, completion of the survey package may contribute to this feeling of fatigue. If this occurs, you may complete the survey package as your energy level permits. In addition, it is possible that an awareness of stress, and/or smoking withdrawal symptoms may increase your stress. All patients in a CCU are monitored for the physical and emotional complications of increased stress following a heart attack. You are advised to report any symptoms of increased stress, such as anxiety, depression, chest pain or other heart symptoms to the CCU staff. Finally, it is possible that you may find some questions to be personal and/or troubling to you. You may choose to not answer any question(s) that you feel is too intrusive and you may withdraw from participation at any time without any penalty. There may also be risks or discomforts involved in taking part of this study that are not known to the researchers at this time.

POTENTIAL BENEFITS TO SUBJECTS AND/OR TO SOCIETY

It is unlikely that you will experience any direct health benefits by participating in this study. However, it is hoped that you will feel some satisfaction in knowing that you have added to the knowledge that health professionals have about how smoking withdrawal affects the physical and emotional health of heart attack patients. It is also hoped that the knowleged gained from this study will assist health care professionals to better address the stress of patients who are hospitalized for AMI. The results of this study may assist nurses to develop strategies to reduce the stress associated with sudden smoking withdrawal following heart attack. Reductions in stress may hopefully reduce the number of complications and deaths that occur from heart attacks. Furthermore, reporting of the results of this study may serve as an incentive for those who smoke to quit smoking. Finally, the results of this study may provide support for further research studies which test the best types of smoking cessation strategies for heart attack patients when they are hospitalized.

PAYMENT FOR PARTICIPATION

You will not receive any payment for participating in this study.

CONFIDENTIALITY

Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission. All hard copies of your data will be stored in a locked cabinet in the researcher's office. Data will be kept for 5 years for possible use in future studies, following which, the data will be shredded.

PARTICIPATION AND WITHDRAWAL

You can choose whether to be in this study or not. If you volunteer to be in this study, you may withdraw at any time without consequences of any kind. The care and treatment that you receive will not be affected if you choose not to participate in the study. You may also refuse to answer any questions you don't want to answer and still remain in the study. The investigator may withdraw you from this research if circumstances arise which warrant doing so. You may also choose to withdraw your information from the study.

FEEDBACK OF THE RESULTS OF THIS STUDY TO THE SUBJECTS

The research findings will be published on the Research Ethics Board website at the University of Windsor (www.uwindsor.ca/reb). You may also contact Kathy Pfaff directly (519-735-3522 or kpfaff@uwindsor.ca) for final results of the study.

SUBSEQUENT USE OF DATA

This data may be used in future studies.

RIGHTS OF RESEARCH SUBJECTS

You may withdraw your consent at any time and discontinue participation without penalty. If you have questions regarding your rights as a research subject, contact:

Research Ethics Coordinator, University of Windsor, Windsor, Ontario, N9B 3P4; telephone: 519-253-3000, ext. 3916; e-mail: lbunn@uwindsor

SIGNATURE OF RESEARCH SUBJECT

I understand the information provided for the study ***Examining the Physiological and Psychological Impact of Smoking Cessation on Patients with Acute Myocardial Infarction: A Comparison of Smokers and Smokers*** as described herein. My questions have been answered to my satisfaction, and I agree to participate in this study. I have been given a copy of this form.

Name of Subject

Signature of Subject Date

SIGNATURE OF INVESTIGATOR

These are the terms under which I will conduct research.

Name of Investigator

Signature of Investigator Date

UNIVERSITY OF
WINDSOR

LETTER OF INFORMATION FOR CONSENT TO PARTICIPATE IN RESEARCH

Title of Study: **Examining the Physiological and Psychological Impact of Smoking Cessation on Patients with Acute Myocardial Infarction (AMI): A Comparison of Smokers and Non-smokers**

You are asked to participate in a research study conducted by Kathryn Pfaff RN and Master's student in Nursing, and her faculty advisor, Dr. Maher El-Masri, from the Faculty of Nursing at the University of Windsor. The findings of this study will be used to partially fulfil the requirements for Kathryn Pfaff's Master's degree.

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PURPOSE OF THE STUDY

The purpose of this study is to learn more about how smoking withdrawal influences the stress levels of people who have experienced an acute myocardial infarction (heart attack).

PROCEDURES

If you volunteer to participate in this study, we would ask you to do the following things:

1. Report your current smoking status (smoker or non-smoker) to the research team.

2. Complete a 20 minute survey package which will be explained to you by a member of the research team. You will be asked to record your answers on a form. The interview will take place at the hospital 2 days after your admission. The survey package consists of three questionnaires: The first asks questions about your stress levels during your hospitalization; the second asks questions about your sleeping patterns; and the third asks questions about your medical and smoking history.

3. Agree to allow a member of the research team to gather some information about your medical history from your medical record.

POTENTIAL RISKS AND DISCOMFORTS

The risks associated with participating in this study are minimal. That is, the risks or discomforts are similar to those that a heart patient would experience in the period of time following a heart attack. Because heart patients often experience fatigue or tiredness following a heart attack, completion of the survey package may contribute to this feeling of fatigue. If this occurs, you may complete the survey package as your energy level permits. In addition, it is possible that an awareness of stress, and/or smoking withdrawal symptoms may increase your stress. All patients in a CCU are monitored for the physical and emotional complications of increased stress following a heart attack. You are advised to report any symptoms of increased stress, such as anxiety, depression, chest pain or other heart symptoms to the CCU staff. Finally, it is possible that you may find some questions to be personal and/or troubling to you. You may choose to not answer any question(s) that you feel is too intrusive and you may withdraw from participation at any time without any penalty. There may also be risks or discomforts involved in taking part of this study that are not known to the researchers at this time.

POTENTIAL BENEFITS TO SUBJECTS AND/OR TO SOCIETY

It is unlikely that you will experience any direct health benefits by participating in this study. However, it is hoped that you will feel some satisfaction in knowing that you have added to the knowledge that health professionals have about how smoking withdrawal affects the physical and emotional health of heart attack patients. It is also hoped that the knowleged gained from this study will assist health care professionals to better address the stress of patients who are hospitalized for AMI. The results of this study may assist nurses to develop strategies to reduce the stress associated with sudden smoking withdrawal following heart attack. Reductions in stress may hopefully reduce the number of complications and deaths that occur from heart attacks. Furthermore, reporting of the results of this study may serve as an incentive for those who smoke to quit smoking. Finally, the results of this study may provide support for further research studies which test the best types of smoking cessation strategies for heart attack patients when they are hospitalized.

PAYMENT FOR PARTICIPATION

You will not receive any payment for participating in this study.

CONFIDENTIALITY

Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission. All hard copies of your data will be stored in a locked cabinet in the researcher's office. Data will be kept for 5 years for possible use in future studies, following which, the data will be shredded.

PARTICIPATION AND WITHDRAWAL

You can choose whether to be in this study or not. If you volunteer to be in this study, you may withdraw at any time without consequences of any kind. The care and treatment that you receive will not be affected if you choose not to participate in the study. You may also refuse to answer any questions you don't want to answer and still remain in the study. The investigator may withdraw you from this research if circumstances arise which warrant doing so. You may also choose to withdraw your information from the study.

FEEDBACK OF THE RESULTS OF THIS STUDY TO THE SUBJECTS

The research findings will be published on the Research Ethics Board website at the University of Windsor (www.uwindsor.ca/reb). You may also contact Kathy Pfaff directly (XXX-XXX-XXXX or kpfaff@uwindsor.ca) for final results of the study.

SUBSEQUENT USE OF DATA

This data may be used in future studies.

RIGHTS OF RESEARCH SUBJECTS

You may withdraw your consent at any time and discontinue participation without penalty. If you have questions regarding your rights as a research subject, contact:

Research Ethics Coordinator, University of Windsor, Windsor, Ontario, N9B 3P4; telephone: 519-253-3000, ext. 3916; e-mail: lbunn@uwindsor.

APPENDIX C

Instructions for Recruitment of Subjects

Screen patients for eligibility:

Inclusion

- 18 years of age and older with a confirmed diagnosis of AMI who are clinically stable
- Able to read and understand English
- Clinically stable

Exclusion

- Unstable patients - those requiring vasoactive medications (except nitroglycerin) and/or mechanical ventilation.
- A history of diagnosis with anxiety or depressive disorders.
- Patients involved in a smoking cessation program prior to hospital admission.
- Patients not admitted to CCU from home i.e. not transferred from another unit or hospital.

Approach the subject on day two after admission to the CCU:

"Hi Mr./Ms._____, my name is _____ and I am _____(state your relationship to the patient – e.g. staff nurse on the unit/reseach assistant). I am also part of a team of researchers doing a study to find out about how smoking withdrawal affects the stress levels and the recovery of people who have experienced a heart attack. Would you mind answering a few questions to see if you would be eligible to participate in the study?

1. Are you a smoker – this includes any nicotine product (cigarettes, pipe, cigars, chewing tobacco). If yes, were you using anything to help you quit smoking before you were admitted to the hospital?
2. Are you being by your doctor treated for anxiety or depression?"

If he/she doesn't qualify, explain this and thank him/her.

If he/she does qualify explain that:

"You qualify to participate in this study. The purpose of this study is to determine if there is a difference in the stress levels and recovery between smokers and non-smokers who have had a heart attack. If you choose to participate I will leave with you a survey package that you may complete as you feel able. The survey asks questions about:

- The symptoms of stress that you are feeling right now
- Your sleeping patterns right now
- Yourself and your health

It will take you about 15 to 20 minutes. We will also record some information about your medical history from your chart. I will give you a copy of the information that will be taken from your chart. Would you consider participating in this study?"

If yes, review the consent form with the patient, including the chart data form. Ensure that he/she understands the risks, benefits, and that participation is voluntary. The patient signs two copies of the consent and keeps one for him/herself. The patient also keeps the letter of information. Once the patient completes the survey, ask him/her to seal the envelope and place it in the drop box. Record the patient code, room number and medical record number and smoking status in the log book.

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