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Sociocultural factors contributing to health care behavior in patients experiencing signs and symptoms of acute myocardial infarction in Japan

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Sociocultural factors contributing to health care seeking behavior in patients experiencing signs and symptoms of acute myocardial infarction in Japan

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ABSTRACT

Sociocultural Factors Contributing to Health Care Seeking Behavior in Patients Experiencing Signs and Symptoms of Acute Myocardial Infarction in Japan

Reducing the time from symptom onset to reperfusion therapy is an important approach to minimizing myocardial damage and to preventing death from acute myocardial infarction (AMI). However, certain ethic or national groups, such as the Japanese, are more likely to delay in seeking care than other groups. The main goal of this dissertation was to examine care seeking behavior in relation to Japanese sociocultural factors in patients with an evolving AMI. In this cross-sectional study, 155 consecutive patients hospitalized for AMI in Japan were interviewed using the modified Response to Symptoms Questionnaire, the Independent and Interdependent Construal of Self Scale, and the Brief Symptom Inventory Anxiety subscale.

Approximately 54% of patients first sought care at a clinic or small hospital that did not provide continuous cardiac care. Prehospital delay time in these patients was 6.2 hours, while prehospital delay time in patients who went directly to hospitals that could provide cardiac intervention was 2.3 hours. In addition, patients with an independent construal of self were significantly less likely to seek treatment at a clinic or small hospital. The interdependent construal of self was positively associated with longer prehospital delay time.

Public education should focus on the appropriate steps patients can take from the onset of cardiac symptoms to seeking treatment. Physician education should focus on the importance of referring patients with symptoms of AMI immediately to a hospital using an ambulance. Understanding care-seeking patterns from a social-cultural perspective

may help clinicians develop culturally appropriate interventions to promote early access to treatment.

Kathleen Dracup, RN. DNSc

August 28, 2003
Date

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CHAPTER ONE

Introduction

BACKGROUND

Ischemic Heart Disease in Japan

Heart disease is the second leading cause of death in Japan (Health and Welfare Statistics Association (HWSA, 2001a)). Of the 120 deaths per 100,000 from heart disease, half of these deaths were due to ischemic heart disease in 1998. In Japan, mortality from ischemic heart disease has a 6-fold increased from 1950 to 2001(HWSA, 2001a). To date, there are no official reports from the Japanese government regarding the incidence of acute myocardial infarction (AMI). However, the estimated incidence of AMI in Japan is significantly lower when compared to other industrialized countries (Fukumoto & Arima, 1998; Sekikawa, et al., 1999). For example, in the United States the death rate for heart disease has been reported to be 260 per 100,000, with 67% of these deaths due to ischemic heart disease in 1998 (American Heart Association (AHA), 2001).

Japanese scientists have expressed concerns that the mortality rate from ischemic heart disease as reported by the Japanese government may be underestimated (Sekikawa et al., 1999, Saito et al., 2000). Despite an increased prevalence of cardiac risk factors, the reported mortality rate from ischemic heart disease declined between the 1970's to the early 1990's. In contrast, the mortality rate due to heart failure steeply increased around the same period (HWSA, 2001a). These trends indicate that Japanese physicians may have used the term "heart failure" to describe end stage ischemic heart disease.

In a comparison study conducted in Japan, South Korea, Taiwan, and the U.S., investigators pointed out that the ischemic heart disease mortality rate among men 35-44 years of age was likely to be underestimated in Japan (Sekikawa et al., 1999). In the

Japanese sample, more than 60% of the mortality from heart disease in this age group was coded as "heart failure", which is an uncommon code in other countries. In contrast, only 1 % of the patient sample was coded as heart failure in the U.S (Sekikawa et al., 1999).

When the 10th revision of the International Classification of Disease was introduced in Japan in 1995, the Health and Welfare Statistics Association added the following instructions for death certificate coding: "Do not put heart failure as a cause of death as a manifestation of a terminal stage of disease." As a result, reported mortality rates for "heart failure" have decreased, while mortality rates for ischemic heart disease have increased (HWSA, 2001a). Given that the mortality rate for adoption of any change is slow, the mortality from ischemic heart disease in Japan could be still underestimated.

Cardiac Risk Factors

After World War II, the Japanese adapted a westernized life-style and started working prolonged working hours in order to redevelop their country. These lifestyle changes often lead to an increase in cardiac risk factors, such as hyperlipidemia, diabetes mellitus, obesity, and sedentary lifestyle. Since World War II, the most prominent changes in the Japanese life style have been dietary. The National Nutrition Survey in Japan (J-NNS) reported that total fat consumption increased about fourfold from 1946 to 2000 (Katanoda & Matsumura, 2002). In addition, the percentage of energy intake from fat has increased from 6.5% to 26.5% from 1946 to 2000. Japanese now consume 14 times as much meat as in 1946. In contrast, salt intake has gradually decreased with a 16% reduction in salt intake from 1973 to 2000 (Katanoda & Matsumura, 2002). These changes have been observed more often in urban areas, such as Tokyo, than in rural areas in Japan.

Due to these changes in diet in part, national data in Japan indicate that total cholesterol levels have increased in the last few decades. In particular, serum cholesterol levels in Japanese young adult men are now similar to U.S. young adult men (HWSA, 1994). Obesity and sedentary lifestyles have also become health issues in Japan. The National Nutrition Survey conducted in 1999 reported that 25% of males and 21% of females who were aged $\geq$ 15 years had a Body Mass Index (BMI) > 25 kg/ m^2 (HWSA, 2001b). This increase in BMI was particularly noted in males in their 50s (Yoshiike et al., 2002). Approximately, 72% of Japanese adult males lead a sedentary lifestyle, even during their leisure time (Hsieh, Yoshinaga, Muto, & Sakurai, 1998). These adult males with a sedentary lifestyle are significantly more likely to smoke, compared to those who exercise at least 30 minutes once a week (Hsieh et al., 1998). Not surprisingly, the incidence of diabetes mellitus has also gradually increased in Japan. In 1999, approximately 2.1 million people were diagnosed with diabetes mellitus in Japan. In addition another estimated 4.8 million people were suspected of having diabetes mellitus (HbA1c $\geq$ 6.1) (HWSA, 2001b).

Unlike other cardiac risk factors, the prevalence of hypertension has decreased in Japan for all age groups from 1980 to 1990 (HWSA, 2001b). However, the number of people with treated hypertension has increased. A recent large study in Japan reported that 35.6% of male and 24.0% of female adults between 40 to 59 years old were hypertensive (blood pressure 140/90 mmHg or greater).

The prevalence of smoking in Japan has gradually decreased over the last three decades (HWSA, 2001b). Yet, 54% of Japanese male adults still smoke (HWSA, 2001). This high prevalence of smoking may be related to the fact that the Japanese government seems hesitant to disseminate anti-smoking campaigns to the public (Watts, 1999). Currently, the Japanese Ministry of Finance owns approximately 70% of Japan Tobacco, which brings in considerable revenue to the government. In addition, only $180,000 was allocated for anti-smoking awareness programs from the national health budget in Japan. In contrast, local community and counties have started their own anti-smoking campaigns.

In Japan, excessive work time, in particular among male workers, is considered to be another important cardiac risk factor (Liu & Tanaka, 2002; Sokejima & Kagamimori, 1998). Sudden death from cardiovascular disease among male workers from excessive work has received considerable public attention (Nishiyama & Johnson, 1997). Japanese media have coined the term coined *"Karoshi,"* to describe sudden death from overwork. Recent Japanese studies reported that long working hours independently predicted AMI, after controlling for other cardiac risk factors (Liu & Tanaka, 2002; Sokejima & Kagamimori, 1998).

In sum, in the last 50 years the prevalence of cardiac risk factors has increased dramatically in Japan due to life style changes. In the future, the incidence of ischemic heart disease may also increase in Japan, unless significant lifestyle modifications are made among the population. Therefore there is an urgent need in Japan for new primary and secondary prevention programs for ischemic heart disease.

Knowledge about Cardiac Risk Factors

Knowledge is necessary for behavior modification. To prevent or control ischemic heart disease, it is important for health care providers to understand an individual's knowledge regarding their health. Unfortunately, while a large number of studies have reported a high prevalence of cardiac risk factors in Japanese samples, there are few reports regarding the knowledge level of the Japanese public regarding such cardiac risk factors.

The J-NNS 2000 report showed that only 28% of their sample responded "often care about their diet/nutrition" from 4 choices, "often," "sometimes," "not so often," and "never" (Katanoda & Matsumura, 2002). Younger generations and males were less likely to care about their diet. This result indicates that younger Japanese and males lack knowledge regarding the links between illness and diet. A survey conducted over 9 residential blocks in Japan reported that approximately 14% of participants were able to state their blood pressure accurately (Tanihara et al., 1999). These participants had greater health-related knowledge and awareness than those who could not state their blood pressure. Public knowledge about the relationship between smoking and various diseases was also examined using a questionnaire (Takano, Kohrogi, Matsumoto, Suga, & Ando, 2001). All lay participants who participated in a seminar on respiratory disease were invited to participate in a study after this seminar. Of 403 participants, only 53% were able to identify smoking as a cause of myocardial infarction. However, because people who participate in such health seminars are usually more aware of the role of lifestyle contributing to diseases than those who do not participate, general public knowledge could be much lower than these participants. In summary, although cardiac risk factors have increased, there are few data about the awareness of cardiac risk factors, among the Japanese population. More importantly, it remains unclear whether AMI patients can correctly identify their cardiac risk factors.

Attribution of AMI Symptom

Interpretation of AMI symptoms as cardiac in origin is an important factor for promptly seeking medical treatment. Japanese studies reported that only 23 to 25% of AMI patients could recognize their symptoms as AMI in origin when experiencing AMI (Sawayama, 1991; Takagi, Tsuruha, Iwata, Shiotsu, & Uwatoko, 1981) Stomach problems or indigestion was the second most common symptom interpretation among AMI patients. Because of the relatively less public education about AMI symptoms in Japan, the majority of AMI patients might not interpret these symptoms as having a cardiac origin.

In addition, the media can create an exaggerated picture of the symptoms of illnesses. Like other nations, the Japanese public may portray AMI symptoms as the type of sharp and crushing chest pain which is often seen in television programs or movies. Although the U.S. has conducted campaigns, such as "Act in Time to Heart Attack Signs," to improve public awareness of AMI symptoms," a recent large U.S. study reported that approximately 80 % of lay people still expected to have "classic" severe symptoms when experiencing an AMI (Finnegan et al., 2000). Discrepancies between expected symptoms and experienced symptoms could also exist in Japan, but they have not been examined in the Japanese population. Moreover, Japanese public education does not emphasize how to respond to AMI symptoms, such as taking aspirin and calling an ambulance. Thus, even though patients are able to interpret symptoms as cardiac in origin, they may not be able to seek medical treatment in a timely manner.

PREHOSPITAL DELAY IN PATIENTS WITH AMI

Significance

Time is of the essence in the setting of AMI. More than 40% of people experiencing heart attacks will die from them, and 20% will die without hospitalization (Association, 2001). Most deaths result from fatal arrhythmias and/or cardiogenic shock. Thus, early access to hospital care can provide treatment for potentially fatal arrhythmias and consequently, save a patient's life.

More importantly, shortening the time from symptom onset to treatment is associated with lower mortality rates (GUSTO Investigators, 1993; FTT, 1994). A recent meta-analysis of 22 randomized trials of thrombolysis (n = 50,246) reported that the greatest reduction in mortality was seen in patients who presented to a hospital within the first hour of symptom onset (Boersma, Maas, Deckers, & Simoons, 1996). This benefit was estimated at 65 (SD 12) lives saved per 1000 (95% CI: 38, – 93) treated patients. The benefit of treatment was still seen between 6 to 12 hours after onset of symptoms, with 18 (SD 6) lives saved per 1000 (95% CI: 7, – 29) treated patients. The association between delay time and mortality was non-linear. Namely, patients who presented within the first two hours after onset of symptoms showed a steeper reduction in mortality than those who presented two hours later.

Weaver (1995) reviewed eight studies to determine the association between time of treatment from onset of symptoms and infarct size. He concluded that myocardial salvage after treatment with thrombolysis is not related linearly to the time between onset of symptoms and treatment, in that substantially greater myocardium salvage is possible within the first hours after onset of symptoms. Even when considering other determinants of infarct size such as the presence/absence of collateral vessels, the location of the occlusion, and episodic flow/no flow after treatment, time still remains the most important factor in myocardial salvage (Weaver, 1995).

Definition of Delay Phases

Total delay time, from onset symptoms of AMI to initiation of reperfusion therapy, can be divided into three phases: 1) the patient/bystander decision delay phase (time from recognition of cardiac symptoms to decision to seek medical care); 2) the transportation phase (time from seeking medical help to hospital arrival); 3) the hospital delay phase (time from hospital arrival to initiation of reperfusion therapy) (Weaver, 1995). Of these phases of delay, the patient's decision phase accounts for approximately two thirds of the total delay time, while the transportation phase accounts for one tenth of the total delay time (Weaver, 1995). Because it may be difficult for patients/bystanders to recall the exact time they made the decision to seek medical help, the prehospital time (a combination of the patient's decision phase and transportation phase) has been reported in the majority of delay studies.

Theoretical Model in Patients with an Evolving AMI

Delay in seeking care behavior for AMI involves a complex interplay of physical, cognitive, emotional, behavioral, and sociocultural factors. The Self Regulatory Model (Leventhal, Nerenz, & Steele, 1984) could guide physical, cognitive, emotional, and behavioral responses, but this model does not include sociocultural influences in the care seeking processes. Thus, a modification of the Self Regulatory Model adding sociocultural components was used as the basis for the current study. It is described in Figure 1.

The Self Regulatory Model involves three stages: 1) cognitive and emotional representation of a health threat, 2) the development of action/coping plans, and 3) appraisal (Leventhal et al., 1984) (C, D, & E in Figure). Emotional responses may be aroused at any of the three stages of the cognitive process and are often parallel to and partially independent of the cognitive process (Leventhal & Cameron, 1987). However, in most cases, the interaction between cognitive and emotional processes is either mutually interfering or mutually facilitating. For example, if people interpret their physical sensations as signs and symptoms of heart attack, fear or anxiety may be aroused. Emotions also may be produced at the appraisal stage.

The prehospital delay time from symptom onset to hospital arrival is the result of the duration of these processes (G in Figure 1). For example, some individuals may call 911 immediate by after onset of symptoms. Some individuals may wait for the symptoms to go away. As seen in Figure 1 (H), the time from onset of symptoms to treatment is related to mortality and morbidity.

The relationship between an individual's characteristics (sociodemographics and medical history) or internal stimuli (severity of chest pain, and type of symptoms) (A and B in Figure 1) and prehospital delay time (G in Figure 1) has been studied extensively. Although patients' experience of AMI symptoms is based on internal sensation, they may describe their symptoms and discuss possible causes or coping strategies with family members, friends, and health care providers. The symptoms that an individual reports, and the interpretation of those symptoms, can have important social implications, such as release from social obligations or social roles (Bishop, 1991; Bishop & Converse, 1986). Cultural differences in beliefs about symptoms oftentimes lead to different representations and different coping strategies on both a cognitive and an emotional level.

Goals of Dissertation

This dissertation consists of 4 data-based research reports presented as chapters. Table 1 shows the organization of the chapters contained in this dissertation. The main goal of this dissertation was to examine the association between care seeking processes and the Japanese culture/health care system in patients with an evolving AMI (chapter 2 & 3). A secondary goal of this dissertation was to explore the illness attributions in patients who experienced AMI (chapter 4 & 5).

Figure 1. Modified Self Regulatory Model for Care Seeking Processes in Patients with AMI

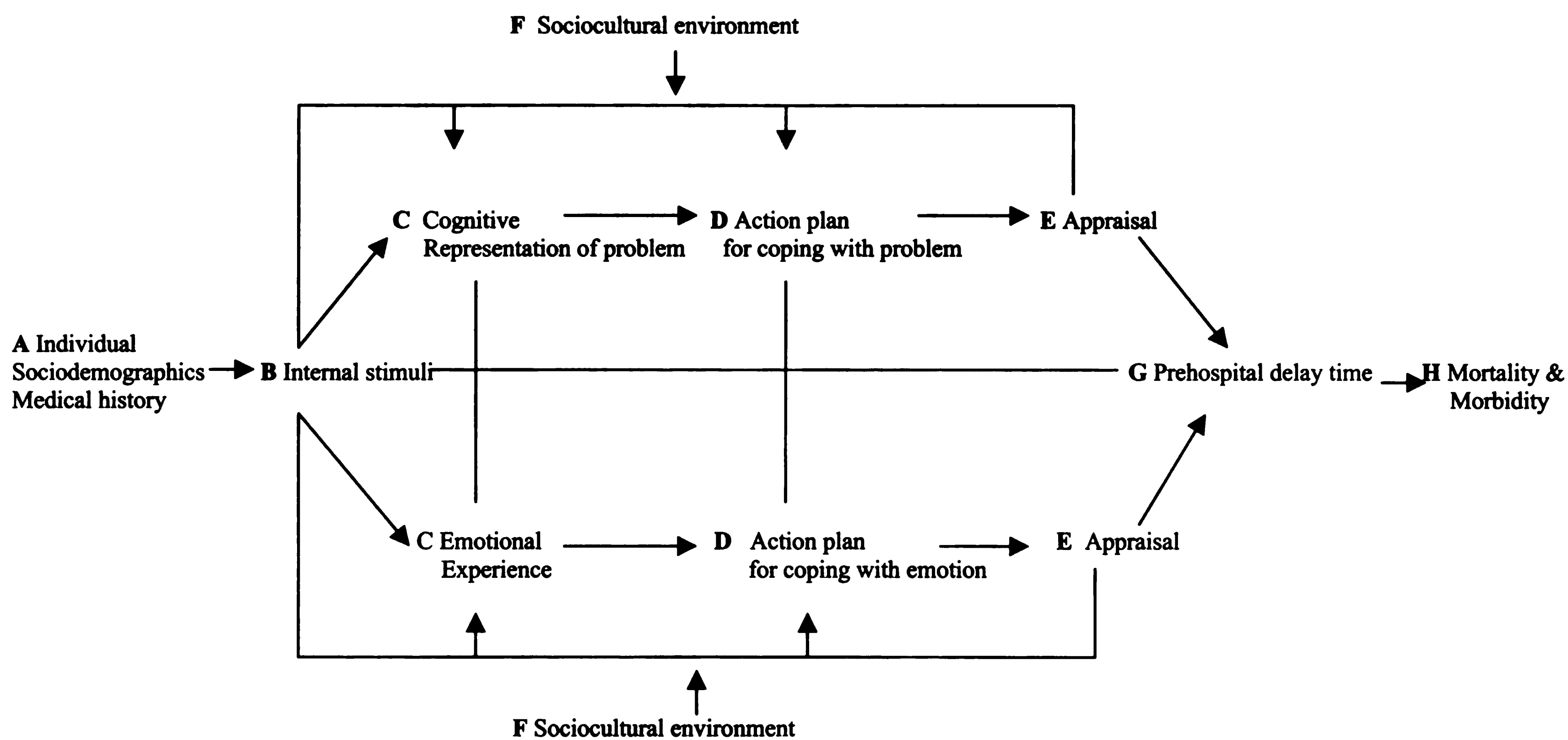

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Table 1 Organization of Dissertation by Studies

Topic	Chapter/ Focus	N	AIMS
Care seeking processes	2 / Health care system	155	1. To describe care seeking processes in relation to the Japanese Health Care System
	3 /Cultural differences	145	1. To examine the relationship between culture differences and prehospital delay time 2. To examine cognitive and emotional responses as a mediator
Illness attribution	4 / Cardiac risk factors	155	1. To describe illness attribution in Japanese patients who experienced AMI
	5 / Job stress	47 (AMI patients) 47 (Healthy subjects)	1.To compare job stress factors between AMI patients and healthy participants; 2.To describe AMI patient's beliefs that job stress caused their AMI

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CHAPTER TWO

Care seeking processes among patients with an evolving acute myocardial infarction in Japan

ABSTRACT

AIM: The aim of this study was to understand the potential impact of the Japanese health care structure on care-seeking processes and treatment in patients experiencing symptoms of acute myocardial infarction (AMI).

METHODS: 155 patients admitted with AMI to hospitals in Japan were interviewed within 7 days after admission.

RESULTS: 84 patients first visited a clinic or small hospital (indirect group) and 71 directly accessed a facility with a cardiac catheterization laboratory (direct group). The median prehospital delay time in the indirect group was significantly longer than the direct group ($p < .001$). However, inhospital delay did not differ between the two groups ($p > .05$). Factors associated with early reperfusion were transportation by ambulance, diaphoresis and admission on weekdays ($p < .05$).

CONCLUSIONS: Prehospital delay in AMI still remains a significant problem in Japan. In particular, seeking care in a clinic leads to longer delays to reperfusion. Public education that focuses on how to respond to AMI, the benefits of early access to treatment, and the use of an ambulance may reduce delay to treatment and ultimately the morbidity and mortality associated with AMI.

Key words : Acute myocardial infarction; Prehospital delay; Japan; Balloon to needle time; Ambulance; Primary angioplasty; Thrombolysis; Clinic; Health care system

INTRODUCTION

In patients with an evolving acute myocardial infarction (AMI), reduction of total delay time from onset of symptoms to reperfusion therapy is critical in order to reduce mortality and morbidity. [1,2] The shorter the total delay time between symptoms and treatment, the better the outcome. The greatest benefit of reperfusion therapy is seen in the first few hours, in particular during the first hour, after onset of symptoms.[1,3]

The benefit of treating patients with an evolving AMI with primary angioplasty versus thrombolysis in AMI is a continuing debate. When patients present at a catheterization center in a timely manner, primary angioplasty can achieve higher patency rates of the infarct-related artery, lower recurrence rates, lower intracranial bleeds, and higher 30-day survival rates than thrombolysis. [4,5,6] However, to provide primary angioplasty for AMI patients, an appropriate laboratory and a skilled staff are required. Primary angioplasty is also a relatively costly medical therapy. Thus, thrombolysis remains the most frequently used reperfusion therapy around the world.[7] In Japan, by contrast, primary angioplasty for AMI patients has become the standard reperfusion therapy over thrombolysis since the 1990s.[8] When Japanese patients are diagnosed with AMI at a clinic or at a small private hospital with no cardiac catheterization laboratory, they are usually transferred to a hospital with catheterization facilities.

The total delay to treatment time consists of two components: 1) prehospital delay time from onset of symptoms to hospital arrival, and 2) inhospital delay time from hospital arrival to reperfusion therapy. [9] To reduce the total delay time, patients must not only promptly seek medical treatment, but also be diagnosed and treated expeditiously at a hospital. In the United States (US), the National, Heart, Lung, and Blood Institute launched the National Heart Attack Alert Program [10] in 1991 to reduce morbidity and mortality from AMI through rapid identification and treatment. The campaign, called "Act In Time To Heart Attack Signs," encourages people with signs and symptoms of AMI to call 911 within a few minutes and at most 5 minutes after onset of symptoms so that they can receive the maximum benefit from reperfusion therapy .[11] The American College of Cardiology /American Heart Association have incorporated the recommended minimal inhospital delay time in an AMI treatment guideline, stating that door-to-needle-time should be less than 30 minutes, and door- to-catheterization-laboratory time (door - to-cath-lab time) should be less than 60 minutes. [12]

Although both prehospital delay time and inhospital delay time contributes to total delay time, prehospital delay accounts for the largest portion of total delay time.[9] To date, the vast majority of studies on prehospital delay have been conducted in the US and Europe. Reported median prehospital delay times range from 1.8 hours to 8.0 hours.[13,14] A recent prospective international comparison study reported that prehospital delay time in Japan was almost twice as long as in the US and the UK. [15] It was not clear why the Japanese took such a long time to reach a hospital compared to the other two countries. One possible explanation for the long prehospital delay time in Japan is that many Japanese patients first seek medical care in a clinic or a small private hospital when experiencing signs and symptoms of AMI, [16,17] but this practice was not assessed in the international study. [15]

The overall aim of the current study was to understand the potential impact of the Japanese health care structure on care-seeking processes and the way patients seek medical treatment when experiencing cardiac symptoms. In this paper we describe the processes of care-seeking from symptom onset to arrival at a hospital, and whether a patient's initial interpretation of symptoms as being related to the heart serves as an independent predictor for an initial visit to a clinic/small hospital that do not have a cardiac catheterization laboratory. In addition we describe the process from arrival at a hospital to initiation of treatment. Finally, we identify factors associated with the time interval from hospital arrival to initiation of treatment. Although factors such as prehospital delay time, [18] ambulance use, [19] inter-hospital triage, time of day/week, and nature of symptoms, [20] have all been implicated in increasing time to treatment, different factors could be associated with time to treatment after arrival at a hospital in the Japanese health care system.

Japanese Health Care System

The Japanese health care system differs from the United States in that patients with new symptoms can seek care in a nearby clinic (some of which have in-patient beds), or in the emergency room of a larger hospital. A clinic is categorized as a medical institution with less than 20 beds. [21,22] In 2000, there were 92,824 clinics in Japan. Of those clinics, 19 % had at least one bed. A hospital in Japan is defined as a medical institution with 20 beds or more, and can house up to 1000 beds. There were 9,266 hospitals (excluding institutions for mental illness, tuberculosis, leprosy, and contagious disease) in Japan. [22] Of these, approximately 40 % were smaller sized hospitals (number of inpatient beds <100). In general, the majority of small sized hospitals and clinics are owned by individual physicians [23] and do not provide specialized cardiac care. All 158 hospitals certified as a tertiary critical care medical center and some hospitals certified as a secondary care center can provide cardiac catheterization 24 hours a day.

Almost all of the 127 million Japanese citizens belong to a type of universal health insurance system (fee-for service) and can access medical care in any hospital or clinic equally with a 20 to 30% copayment. [24] Patients greater than 70 years of age pay less of a copayment. [24] More than half of the patients treated in a university medical center receive care without any specialist referral,[25] since there is no official system assigning general practitioners to patients. [26]

In an emergency situation such as AMI, people can access an ambulance without a fee and will be taken to a hospital where treatment is available. The median time from emergency medical service call to arrival at the scene is approximately 5 minutes. [27] The Coronary Care Unit (CCU) network was established among local hospitals in large cities in Japan to transfer patients with suspected AMI to a hospital with continuous cardiac care. [16] This CCU network also enhances public awareness of AMI and educates paramedics and general practitioners about the need to treat patients with symptoms of AMI rapidly.

A system of ambulance staff trained as paramedics started in Japan in 1991.[28] Unlike the U.S., prehospital emergency medical care by paramedics is limited.[21] For example, paramedics cannot perform endotracheal intubation and cannot administer cardiac medication intravenously. However, with a physician's permission, paramedics can use a defibrillator, administer an electrolyte solution through a peripheral intravenous route, or use a laryngeal mask airway or an esophageal tracheal twin-lumen airway device.[27]

For purposes of this study, clinics or small hospitals that did not have a cardiac catheterization laboratory and did not provide continuous cardiac care were named "Level I hospitals." Hospitals that had a cardiac catheterization laboratory and provided cardiac care around the clock were named "Level II hospitals." Patients who initially visited a Level I hospital were termed the "indirect group" and those who went directly to a Level II hospital were termed the "direct group."

METHODS

Clinical Sites and Sample

We collected data from January to August 2002 at two university medical centers, two community hospitals, and a national cardiovascular center in Japan. The capacity of inpatient-beds ranged from 150 beds to 1260 beds in these medical institutions. All clinical sites were able to provide cardiac catheterization 24 hours/day and qualified as either secondary or tertiary emergency medical facilities. These medical institutions were located in urban areas in Japan.

Patients who were 1) mentally alert, 2) able to speak Japanese, 3) hemodynamically stable, 4) living independently, 5) no history of advanced malignancy or other debilitating illness, and 6) diagnosed with AMI were recruited into the study. The AMI diagnosis was based on elevated cardiac enzyme levels, and at least one of these other criteria: 1) a history of AMI symptoms, 2) electrocardiographic changes reflecting AMI (development of pathologic Q waves, ST depression and/or ST elevation), and/or 3) coronary artery intervention.[29]

In total, 258 patients were admitted to the hospital with the diagnosis of AMI during this period of data collection. Of those, 5.0 % (n =13) of the patients refused to participate in the study. In total, 34.9 % (n = 90) patients did not meet the inclusion criteria. Of these, 13.2 % (n = 34) patients were not hemodynamically stable; 13.2 % (n = 34) patients were not mentally alert (delirium, dementia, severe depression); 2.3% (n = 6) patients died; 1.9% (n = 5) patients were already hospitalized when they had AMI; 1.6% (n = 4) patients had communication problems (hearing/speaking), and the remaining 2.7% (n = 7) were excluded for other reasons. As a result, 60.1% (n = 155) patients participated in the study.

Procedure

Investigators obtained approval from the Institutional Review Board at all clinical sites before contact was made with any patients. A researcher approached patients who met all inclusion criteria after permission to interview was received from the patient's physician and nurse. The study was explained to each potential patient and a written informed consent was obtained. All patients were interviewed within 7 days of their hospital admission (mean 3.6 days $\pm$ SD 1.7 days), although the average length of hospital stay in these patients was 16 days. Patients' interviews were conducted as soon as possible after the patient became hemodynamically stable in order to obtain the most recent representation of their information.

Measures

Sociodemographic factors and clinical factors

Sociodemographic factors were assessed by medical chart review and patient interview. They included age, gender, highest educational level, annual household income, marital status, the number of family members living with the patient, and employee status. Education levels were categorized into two groups; $\geq$ college and < college graduation. Annual household income was categorized into two groups; < \$33,333 (¥4,000,000) and $\geq$ \$33,333. The average household income was approximately

$ 54,000 (¥6,480,000) in Japan in 2002.[13] A recorded history of coronary heart disease (CHD) was obtained from medical chart review.

Delay time definition and measurement

Total prehospital delay time was defined as the time interval from onset of symptoms to arrival at a hospital equipped with a cardiac catheterization laboratory and the ability to provide cardiac care 24 hours a day, 7 days a week. Total prehospital delay time was divided into two segments: ***Prehospital Delay Time1*** was defined as the time from onset of symptoms to arrival at a Level I hospital not equipped with a cardiac catheterization laboratory and without continuous cardiac care. ***Prehospital delay Time2*** was defined as the time from arrival at a Level I hospital to arrival at a Level II hospital equipped with a cardiac catheterization laboratory. Inhospital delay time was categorized as ***"door-to- needle-time"*** **or** ***"door -to-cath-lab-time."*** Door- to- needle- time was defined from Level II hospital arrival to thrombolytic therapy initiation. Door-to-cath-lab-time was defined from Level II hospital arrival to time patient entered the cardiac catheterization laboratory. Level I hospital arrival time, Level II hospital arrival time, thrombolytic therapy initiation time, and time when patients entered the cardiac catheterization laboratory were assessed by medical chart review.

Social situation, AMI symptoms, and recognition of symptoms

Severity of chest pain was measured on a 1 to 10 scale, with a greater number indicating greater severity. Diaphoresis was assessed by a yes/no question. The time of symptom onset, the place symptoms started, witnesses present when symptoms started, patient symptom interpretation, and knowledge about AMI treatment were assessed by the modified Response to Symptoms Questionnaire, which was translated into Japanese for a previous study. [15] Patients were also asked to list all medications and alternative medicine treatments after symptom onset prior to hospital arrival.

Statistical analysis

SPSS version 11 for Windows was used for data analysis. Frequency, measures of central tendency, standard deviations, and percentiles were used to describe the sample characteristics, prehospital and inhospital delay time, and mode of transportation. Independent t-tests, Fisher's exact tests, and Chi-Square were used to compare sample characteristics between the indirect group and direct group. The Mann-Whitney U test was used to compare the total prehospital delay time and inhospital delay time (door-to-needle-time or door-to- cath-lab- time) between the indirect and direct groups. Patients who received reperfusion therapy at a Level II hospital were classified into two groups (early and late treatment groups) using the median inhospital delay time. A multiple logistic regression analysis was performed to identify predictors of late treatment group membership. A two-tailed level of significance was set at alpha level .05.

Limitations of this study

Our ability to generalize the results to all Japanese patients admitted to a hospital with AMI is limited by the approximately 40% of patients who did not meet inclusion criteria or refused to participate in the study. In addition, we collected data in urban areas in Japan where public transportation was well established, and clinics and hospitals were located within short distances of each other. Caution should be exercised in generalizing the study results to patients who live in rural areas of Japan or other countries.

RESULTS

Sample Characteristics

Out of a total of 155 patients, 54.2% (n = 84) patients first arrived at a Level I hospital (either a clinic or a small hospital without a catheterization laboratory) and were then transferred to a Level II Hospital (see Figure 1). Of those 84 patients who initially sought care at a Level I hospital, one patient visited a second Level I hospital when symptoms continued, and two patients were transferred from a Level I hospital to another Level I hospital prior to being transferred to a Level II hospital.

45.8% (n = 71) patients directly accessed a hospital with a catheterization laboratory (Level II Hospital). Table 1 shows a comparison of demographics between the indirect and direct group. Except for annual household income, other sociodemographic characteristics were similar between the two groups. The percentage of patients with an annual household income < $33,333 was higher in the indirect group than in the direct group (p =. 02). However, this income difference disappeared after controlling for age, gender, severity of chest pain, and symptom interpretation.

Situational Factors, Self-Medication, and Recognition of AMI

Approximately 60% of AMI's occurred at home and 57% of the patients were with family members upon onset of their AMI (see Table 2). Twenty- three percent of patients used non-cardiac medication and/or alternative medicine (e.g. acupuncture, herbs) prior to seeking medical help. No differences were observed between the indirect and direct groups in the place symptoms started, who patients were with, and the use of non-cardiac medications. Only 2.4% of patients in the indirect group took aspirin when they noticed their symptoms. None of patients in the direct group took aspirin. Approximately 11 %

took some type of nitrate in the direct group, while 23% of patients took it in the indirect group. However, this finding was not significant ($p = .052$). The percentage of patients who recorded a history of CHD did not differ between the indirect and direct groups.

Less severe chest pain and not recognizing symptoms as cardiac in origin were significantly associated with Level I hospital visits ($p < .01$). A multiple logistic regression analysis was performed using admission to a Level 1 hospital as the dependent variable. Controlling for age, gender, and income, patients with less severe chest pain were 1.2 (95% CI 1.03, -1.34) times more likely to seek care at a Level I hospital than those who had more severe chest pain. In addition, patients who did not recognize symptoms as cardiac in origin were 3.2 (95% CI 1.5, – 6.9) times more likely to visit a Level I hospital compared to those who ascribed their symptoms to a cardiac cause. Approximately 42 % of patients had heard about reperfusion therapy for AMI prior to their AMI. When the patients who had heard about the types of AMI treatment were asked to describe the treatment, all of them could describe angioplasty (open the artery with a balloon), but none knew about thrombolytic therapy.

Prehospital Delay Time & Transportation Mode

Figure 1 shows patient trajectories from onset of symptoms until reperfusion therapy. Patients in the direct group had a significantly shorter prehospital delay time than those in the indirect group (see Table 3 and Figure 1). In the direct group, the median prehospital delay time from onset of symptoms to admission to a Level II hospital was 2 hours 9 minutes, while in the indirect group, the median prehospital delay time was 6 hours 48 minutes. Among patients in the indirect group, median time from onset of symptoms to arrival to a Level I hospital was 3 hours, and from Level I hospital arrival to

Level II hospital arrival was 1 hour and 50 minutes (Figure1). In the indirect group, only four out of 84 patients received a single bolus intravenous thrombolysis (tissue plasminogen activator (t-PA)) at a Level I hospital, and for the most part they were sent to the Level II hospital for treatment.

Table 4-1 shows the transportation mode from the place where symptoms occurred to the Level I hospital. In the indirect group, arrival by car or on foot was the most common transportation mode. Approximately 30 % of patients drove to the Level I hospital and of those, 44% drove themselves. Only 17% called 911. After diagnosis at a Level I hospital, approximately 75 % of the patients were transported to a Level II hospital by ambulance (see Table 4-2). In the direct group, 73% (n=52) of patients called 911. Approximately 21% (n=15) came by a car and of those, 10% (n=7) drove themselves.

Inhospital Delay Time & Reperfusion Therapies

Table 3 and Figure 1 also shows the comparison of door-to-needle-time and door-to-cath-lab time between indirect and direct groups in a Level II hospital. Median door-to-needle-time and door-to-cath-lab times in the indirect group were shorter than in the direct group. However, this trend was not statistically significant. Door-to–needle time and door- to-cath-lab time were 19 minutes and 59 minutes in the indirect group, and 23 and 75 minutes in the direct group, respectively.

In the indirect group, 24% (n=20) of patients did not receive any reperfusion therapy, while in the direct group, only 7% (n=5) did not receive reperfusion therapy ($p = .005$). In the indirect group, 19 patients were first treated by t-PA, and 18 of them were sent to the catheterization laboratory. Forty-five patients (including four patients who received t-PA at a Level I hospital) were sent directly to the catheterization laboratory. In the direct group, 18 patients were subsequently treated with t-PA and all but one of these were then sent to the catheterization laboratory. Forty-eight patients were sent to the catheterization laboratory without t-PA.

For the entire study sample, 83.9% (n = 130) were treated with some form of reperfusion therapy. Among the 130 patients who received reperfusion therapy, four patients received a single intravenous bolus of t-PA at a Level I hospital and were taken to a Level II hospital, while 126 patients first received reperfusion therapy at a Level II hospital. In the remaining126 patients, the median time from arrival at a Level II hospital to initiation of reperfusion therapy was 55 minutes.

Predictors of time from Level II hospital arrival to reperfusion therapy

One hundred twenty-six patients who received reperfusion therapy at a Level II hospital were categorized into an "early treatment group" (<55minutes; n=62) or "late treatment group" (≥55minutes; n=64). Predictors of delay to treatment were selected based on previous research findings, and a univariate analysis was conducted between predictors and early/late treatment group assignment (Table 5). A multiple logistic regression was performed on the late treatment group (Table 6). The independent factors examined in this analysis in relation to the late treatment group identification were age, sex, severity of chest pain, diaphoresis, time (≥ 8am to < 6pm versus ≥ 6pm to < 8 am) and day of week (weekend/holiday versus weekday) of onset of symptoms, ambulance use, and admission to a Level I hospital. Table 6 shows the results of the multiple logistic regression analysis. Patients who were not diaphoretic, who were not transferred by ambulance, or who were admitted on a weekend or holiday were more likely to be in the late treatment group, compared to those patients who were diaphoretic, transferred by ambulance, and admitted on a weekday ($p < .05$).

DISCUSSION

In this study, more than half of the patients who experienced an AMI accessed a Level I hospital. These patients had a prehospital delay time approximately three times longer than patients who presented immediately at a Level II hospital. These results suggest that significant barriers to timely treatment of AMI exist in the current Japanese medical care system. Specifically, the number of clinics is approximately ten times greater than the number of hospitals in Japan.[22] A clinic is oftentimes closer to patients' homes, particularly in urban areas. In addition, an appointment is usually not required. In Japan, some clinics are open in the evening (e.g. 5 to 8pm). Therefore, it is convenient for patients who are experiencing cardiac symptoms to access a clinic rather than seek care at a Level II hospital. In addition, if a patient had been treated by a primary care physician prior to the onset of an AMI, he or she might be more comfortable seeing a primary care physician first instead of calling an ambulance or going directly to the emergency department of a Level II hospital. Clinics or small hospitals are useful for patients with a non-life threatening illness, such as cold or stomach pain, because they can walk in with no appointment.

Several US investigators reported that calling a physician during an AMI was associated with a prolonged prehospital delay time. [30-32] However, because the medical care system in the U.S. does not encourage patients to visit a primary care physician without an appointment, patients seek care in an emergency department.

Situational Factors, Self-Medication, and Recognition of AMI

Unlike the situation in the US, the benefits of taking aspirin for AMI have not been disseminated to the Japanese public. In this study, only two patients took aspirin prior to seeking medical help and in both cases aspirin was taken to relieve pain. In contrast, approximately 18% of patients treated themselves with some form of nitrate. However, some patients who took nitrates prior to seeking medical help or who had a history of a previous cardiac event still sought medical help at a Level I hospital. Health care providers need to provide the public (in particular patients at risk for AMI) with detailed instructions as to how, when, and where to seek medical treatment. In total, approximately one-fourth of patients treated themselves with different kinds of non-cardiac and/or alternative medications prior to seeking medical help. Patients who treated themselves may have delayed seeking treatment in the hope that symptoms would go away.

Not interpreting symptoms as cardiac and having less severe chest pain independently predicted Level I hospital visits after controlling for age, gender, and income. In our sample, only one-third of the study participants interpreted their symptoms as cardiac when they first started to experience the signs and symptoms of AMI. This observation points to the need to enhance public awareness in Japan regarding signs and symptoms of AMI.

Prehospital delay time and treatment

Median prehospital delay time (2 hours and 9 minutes) in patients who sought treatment at a hospital with cardiac facilities was similar to a recent large U.S. study. [33,34] However, median prehospital delay time in patients who sought treatment at a Level I hospital (indirect group) was approximately three times greater than in the direct group. There are several possible explanations for this prolonged prehospital delay time in the indirect group. First, patients in the indirect group used an inappropriate mode of transportation. Approximately 40% of these patients walked, bicycled, took public transportation, or used other less rapid means. These transportation modes were not only unsafe for someone with an evolving AMI, but also time inefficient. Second, patients in the indirect group often had to wait to see a physician, since in general, patients were treated on a first-come, first-served basis. Third, few clinics or small hospitals in Japan are equipped with an automatic biochemistry analyzer (Ministry of Health and Welfare, 1990).[22] Therefore, in this study, the blood samples of patients initially seeking care in Level I hospitals were sent to outside facilities. Until the results of the cardiac enzyme tests were returned, patients were often sent home without further treatment.

In our study, 97% of patients did not receive thrombolytic therapy prior to a Level II Hospital admission. The majority of clinics and smaller sized hospitals do not commonly carry thrombolytic drugs, such as t-PA or streptokinase. Upon diagnosis with AMI, patients are often transferred to a large hospital that can provide coronary catheterization and continuous cardiac monitoring

Inhospital delay time and predictors of initial reperfusion therapy

In our study, the median door-to-needle-time was 19 and 23 minutes in both the indirect and direct groups respectively once patients arrived at a Level II hospital. A recent multi-site study reported that median door-to-needle time was approximately 40 minutes. [18] The Danish Multicentre Randomized Trial on Thrombolytic Therapy versus Acute Coronary Angioplasty in Acute Myocardial Infarction (DANAMI-2) also reported a similar result.[35] Despite low use of thrombolytic therapy in our sample, door-to-needle-time was shorter than the reports described above. A possible explanation for this observed shorter time was that all thrombolysis was administrated as a single bolus intravenous injection in the emergency department.

It is difficult to compare our findings regarding the door-to-cath-lab time, to other US and European studies, since they used door-to-balloon time, not door-to-cath-lab time.[20,35] Unfortunately, we are not able to obtain the balloon inflation time from the medical records at most clinical sites. A Japanese study investigated the effectiveness of the implementation of critical pathways in an emergency department to reduce door-to-cath-lab time. [36] The median door-to-cath-lab time was significantly reduced from 65.5 minutes to 50.0 minutes after critical pathway implementation. The door-to-cath-lab time prior to the implementation was similar to the results of this study.

In our study, the factors associated with an increased treatment delay such as no ambulance use, hospital admission on weekends/holidays, or absence of diaphoresis, were similar to those in previous studies.[19,20] Longer time to initial reperfusion therapy is associated with limited staffing on weekends/holidays. Health care providers quickly triage patients who are diaphoretic or arrive by ambulance. A recent large US study reported that use of emergency medical systems (EMS) was significantly associated with reducing the door to needle time (12 minutes) or reducing door to balloon inflation time (3 1 minutes).[19] However, only 43% of our participants initially called an ambulance. Moreover, not all patients who visited a Level I hospital were transferred to a Level II hospital by ambulance. Not transferring patients by ambulance further delayed treatment.

In summary, similar to American and European studies, the majority of patients in our study did not call an ambulance or take aspirin with the onset of AMI symptoms. Public education must focus on the appropriate steps to take from the onset of cardiac symptoms to seeking treatment. Although a large network of neighborhood clinics and small hospitals are appropriate and cost effective for people with chronic illness or with non-life threatening illness, visiting these medical institutions during AMI contributes an extra time delay to reperfusion therapy. Physician education should focus on the importance of referring cardiac patients immediately to Level II hospitals and using an ambulance. Public education must emphasize not only the signs and symptoms of AMI, but also the importance of seeking care at a Level II hospital.

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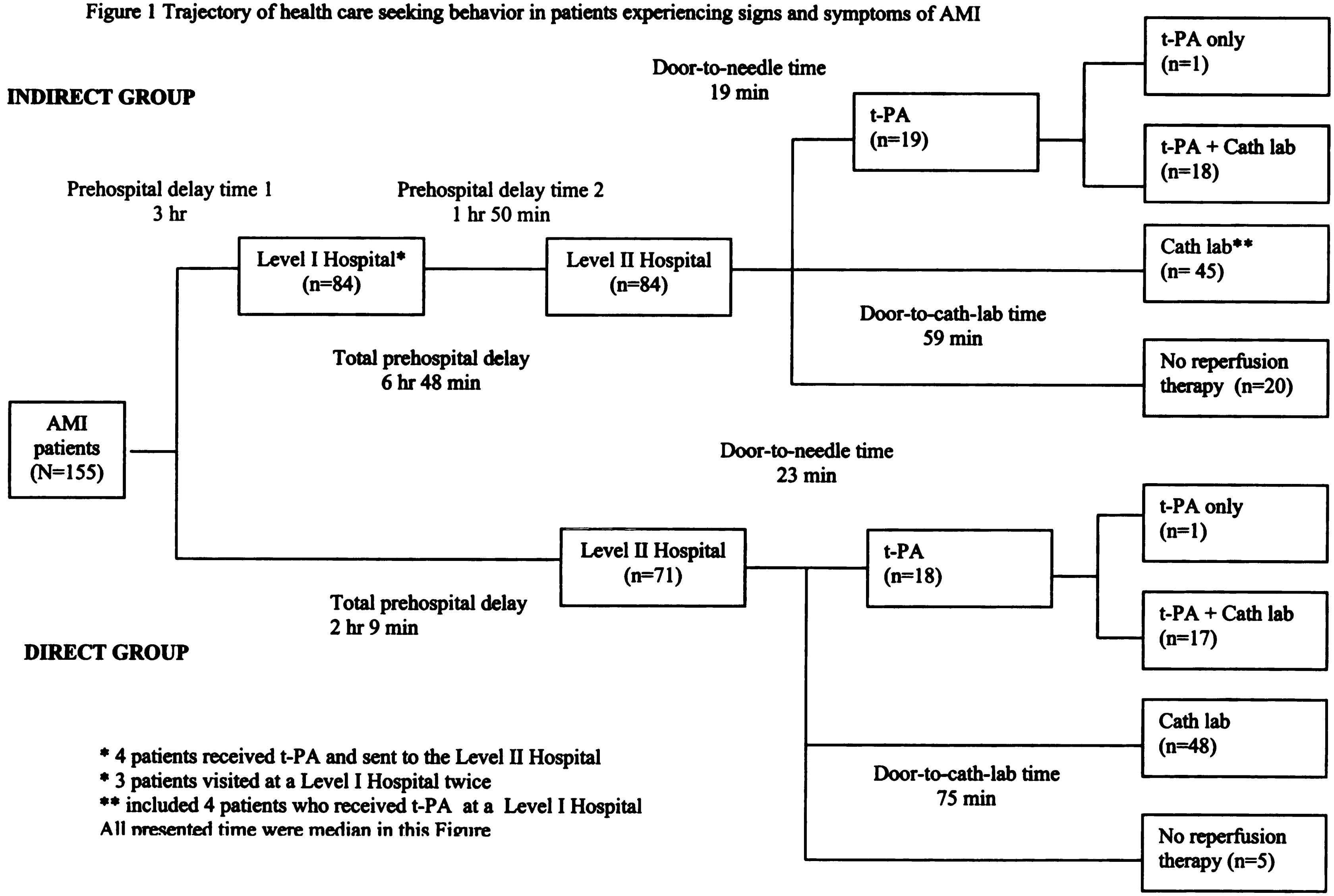
Figure 1 Trajectory of health care seeking behavior in patients experiencing signs and symptoms of AMI



* 4 patients received t-PA and sent to the Level II Hospital
* 3 patients visited at a Level I Hospital twice
** included 4 patients who received t-PA at a Level I Hospital
All presented time were median in this Figure

Table1. Comparison of sociodemographics between indirect and direct groups

Characteristic	Total N=155	Indirect group (n= 84)	Direct group (n=71)	p
Average age ± SD (year)	62.0 ± 11.0	63.3 ± 10.2	60.3 ± 11.7	.10
	% (n)	% (n)	% (n)	
Gender (male)	86.5 (134)	85.5 (71)	87.5 (63)	.82
≥ College education	30.3 (47)	27.7 (23)	33.8 (24)	.48
Married	78.7 (122)	78.3 (65)	79.2 (57)	1.00
# of family membersφ				.10
Alone	12.3 (19)	10.7 (9)	14.1 (10)	
Two	44.5 (69)	52.4 (44)	35.2 (25)	
≥ three	43.2 (67)	36.9 (31)	50.7 (36)	
Employee †	63.2 (98)	56.0 (47)	71.8 (51)	.05
Annual household income‡				.02
< $33,333	50.0 (58)	50.0 (39)	29.2 (19)	
≥ $33,333	21.3 (85)	50.0 (39)	70.8 (46)	

φ living with patient in household
† including part time job
‡ $1 = ¥120, 6 patient in each group did not want to answer their income.

Table 2 Comparison of Situational Factors, Self-Medication, and Recognition of AMI

	Total (N=155) % (n)	Indirect group (n=84) % (n)	Direct group (n=71) %(n)	p
Place†				.82
Home	59.4 (92)	57.1 (48)	62.0(44)	-
Work/public place	24.5 (38)	26.2 (22)	22.5 (16)	-
Other	16.1 (25)	16.7 (14)	15.5 (11)	-
Symptom interpretation †				.001
Heart *	34.2 (53)	23.8 (20)	46.5 (33)	.004
Indigestion	20.7 (32)	25.0 (21)	15.5 (11)	.17
Other*	27.7 (43)	38.1 (32)	15.5 (11)	.002
No idea	17.4 (27)	13.1 (11)	22.5 (16)	.14
Medication				
Non-cardiac medication‡	22.6 (35)	26.2 (22)	18.3 (13)	.29
Aspirin	1.3 (2)	2.4 (2)	(0)	-
Nitrate‡	17.4 (27)	10.7 (9)	22.5 (16)	.05
History of CHD	20.0 (31)	17.9 (15)	22.5 (16)	.55
Knew AMI treatment ‡	41.9 (65)	47.0 (39)	37.1 (26)	.25
With who†				.44
Alone	29.0 (45)	31.0 (26)	26.8 (19)	-
Spouse or/and family	56.8 (88)	52.4 (44)	62.0 (44)	-
Others	24.2 (22)	16.7 (14)	11.3 (8)	-
	X + SD	X + SD	X + SD	
Chest pain severity (0-10scale)	7.2 ± 3.0	6.6 ±3.1	8.0 ± 3.0	.002

* Post hoc analysis P <.01, † Chi Square test, ‡ Fisher Exact Test, - Did not test

Table 3 Time comparison between indirect group and direct group

Median time	Indirect group Time (n)	Direct group Time (n)	p value
Total prehospital delay time	408 min (84)	125 min (71)	< .001
Door-to-needle-time†	19 min (19)	23 min (18)	.57
Door- to-cath-lab time†	59 min (45)	75 min (48)	.07

† Time calculated from arrival at Level II hospital; Mann-Whitney Test was used.

Table 4-1. Transportation Modes To Level I Hospital (Indirect group n = 84)

Transportation modes	% (n)
Car	29.8 (25)
Walking	22.6 (19)
Ambulance	16.7 (14)
Taxi	11.9 (10)
Bicycle	11.9 (10)
Public transportation	4.8 (4)
Other	2.4 (2)

Table 4-2 Transportation Modes To Level II Hospital

	To Level II Hospital		
Transportation modes	Total (N=155)	Indirect group (n=84)	Direct group (n=71)
	% (n)	% (n)	%(n)
Car	17.4 (27)	14.3 (12)	21.1 (15)
Ambulance	72.9 (113)	72.6 (61)	73.2 (52)
Taxi	8.4 (13)	10.7 (9)	5.6 (4)
Bicycle	.65 (1)	1.2 (1)	0
Public transportation	.65 (1)	1.2 (1)	0

Table 5 Comparison between early and late treatment groups (n = 126)

Predictors	Initial Reperfusion Therapy at Level II hospital		
	Early group (< 55 min; n=62)	Late group ($\geq$ 55 min; n=64)	p
	Mean $\pm$ SD	Mean $\pm$ SD	
Average age (year)	61.4 $\pm$ 9.9	61.0 $\pm$ 11.9	.86
Average severity of chest pain §	7.7 $\pm$ 2.9	7.4 $\pm$ 2.9	.62
	% (n)	% (n)	
Male gender	87.1 (54)	87.5 (56)	1.00
Present of Diaphoresis	24.2 (15)	45.3 (29)	.02
Admission date : Weekend/holidays †	75.8 (47)	60.9 (39)	.09
Admission time : > 6 pm to $\leq$ 8 am†	58.1 (36)	54.7 (35)	.73
Ambulance use : Yes	87.1 (54)	60.9(39)	<.01
Level I hospital visit : Yes	46.8 (29)	57.8 (37)	.28

§ (0 to 10 scale); † Weekdays, $\leq$ 6pm to > 8am

Table 6 Multivariate logistic regression on late treatment (n=126)

Predictors of late treatment †	Odds ratio	95% CI‡	p
Age	0.99	0.95-1.03	.64
Female sex	0.82	0.25-2.77	.75
Severity of chest pain ≤ 7	1.39	0.57-3.01	.53
Absence of diaphoresis	2.46	1.07-5.62	.034
Hospital admission on weekends/holidays	2.97	1.19 -7.43	.02
Hospital admission between 6 pm to 7:59 am	1.05	.46 – 2.38	.91
Did not transfer by ambulance	5.74	2.16-15.28	<.001
Level I hospital visit	1.01	0.61-1.67	.98

†Reference categories: age in one year increment, male sex, chest pain > 7presence of diaphoresis, hospital admission on weekdays and between 8 am to 5:59 pm transferred by ambulance, and no Level I hospital visit.

‡ CI indicates confidence interval.

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CHAPTER THREE

Culture and prehospital delay among Japanese patients with acute myocardial infarction

ABSTRACT

Reducing the time from symptom onset to reperfusion therapy is an important approach to minimizing myocardial damage and to preventing death from acute myocardial infarction (AMI). Previous studies suggest that certain ethnic or national groups, such as the Japanese, are more likely to delay in accessing care than other groups. The aims of this paper were the following; 1) to examine whether culture (defined as independent and interdependent construal of self) is associated with delay in accessing medical care in Japanese patients experiencing symptoms of acute myocardial infarction (AMI); 2) to determine if the relationship between independent and interdependent construal of self and prehospital delay time is mediated by cognitive or emotional responses; and 3) to determine if independent and interdependent construal of self independently predicts choice of treatment site (clinic vs hospital).

A cross-sectional study was conducted at hospitals in urban areas in Japan. One hundred and forty-five consecutive patients who were admitted with AMI within 72 hours of onset of symptoms were interviewed using the Modified Response to Symptoms Questionnaire, the Independent and Interdependent Construal of Self Scale, and the Brief Symptom Inventory Anxiety subscale. The interdependent construal of self scores were significantly associated with prehospital delay time, controlling for demographics, medical history, and symptoms ($p < .001$). However, the relationship between independent and interdependent self and prehospital delay times was not mediated by cognitive or emotional responses. In multiple logistic regression analysis, patients with high independent construal of self were more likely to seek care at a hospital rather than a clinic compared to those with lower independent construal of self. In conclusion, cultural variation within this Japanese group was observed and was associated with prehospital delay time.

Keywords: Independent and Interdependent Construal of Self, Acute myocardial infarction, care-seeking, culture, Japan, Prehospital delay

INTRODUCTION

Reducing the time lag from symptom onset to reperfusion therapy is an important approach to minimize myocardial damage and to prevent death from acute myocardial infarction (AMI) (FTT, 1994; GUSTO, 1993). Prehospital delay time and factors associated with prehospital delay time have been extensively explored in the United States, Europe, and Australia. However, there have been far fewer studies reported in Asia in general and in Japan in particular.

Reported median prehospital delay time from symptom onset to hospital arrival ranges from 1.8 to 8.0 hours in Western countries (Ridker, Manson, Goldhaber, Hennekens, & Buring, 1992; Tjoe & Luria, 1972). Sociodemographics, clinical characteristics, and social context factors have been extensively studied in relation to prehospital delay time over the last two decades (Caldwell, Froelicher, & Drew, 2000; Dracup & Moser, 1991; Goldberg, Yarzebski, Lessard, & Gore, 2000; Group, 1995; Yarzebski, Goldberg, Gore, & Alpert, 1994). However, socio-cultural influences have yet to be described, particularly as they influence cognitive and emotional responses to cardiac symptoms.

One consistent finding from previous studies is that patients in certain ethnic groups or nationalities are more likely to delay in accessing care when experiencing signs and symptoms of AMI compared to Caucasians (Dracup et al., in print; Goff et al., 1999; Goldberg et al., 2002; Gudykunst, Matsumoto, Ting-Toomey, & Nishida, 1996). For example, a multi-site study reported that AMI patients from Europe and South America were significantly more likely to delay in seeking medical help compared to patients from North America or Australia/New Zealand (Goldberg et al., 2002). Dracup and her colleagues (Dracup et al., in print), compared the prehospital delay time between Western countries (US and UK) and Asian countries (Japan and Korea). Median prehospital delay times in the US and the UK were 3.3 and 2.5 hours respectively, while the median prehospital delay times in Korea and Japan were 4.4 and 4.5 hours respectively. Besides the observation that ethnicity or nationality was related to delay in care-seeking behavior, other possible explanations for the differences in delay times between these nationalities and ethnic groups have not been explored.

Culture shapes an individual's beliefs, values, attitudes, and behavior. Ethnicity or nationality is not equivalent to culture (Matsumoto, 1996). However, people within a certain ethnicity or nationality frequently share a culture. Furthermore, culture influences social rules and structures, such as the medical care system. Cultural differences, in turn, may lead to different care seeking patterns in patients experiencing symptoms of AMI.

Culture is an abstract concept and is difficult to define and to compare as a unit of analysis. Individualism–Collectivism is the most well known cultural level dimension. Cultures that emphasize individualism, represented by most northern and western regions of Europe, North America, and Australia, emphasize an individual's goals, autonomy, and freedom over group goals (Singelis, 1994). In contrast, cultures that are characterized by collectivism, represented by Asia, Africa, and South America, emphasize group goals over individual goals and harmony within a group (Singelis, 1994). The concept of independent/interdependent construal of self, which is derived from this individualism-collectivism concept, has been used to explain an individual's behavior, cognition, emotion, motivation, and communication. The concept of independence emphasizes an individual's uniqueness and expression of self (Markus & Kitayama, 1991). The self is stable despite a changing social context. The concept of interdependence emphasizes a social role, status, and relationship to others under a certain social context (Markus & Kitayama, 1991). Self can be changed depending on social context, and an individual's appropriate action will be guided by the social situation.

It is important to note that a considerable variation in the independent and interdependent construal of self also can occur within a single culture, as well as across cultures (Matsumoto, 1996). In addition, individuals across cultures present both types of construal of self, but the degree to which they present independent and interdependent construal of self can be different (Markus & Kitayama, 1991). For example, some individuals from bicultural backgrounds can demonstrate either independent or interdependent construal of self depending on the situation (Yamada & Singelis, 1999).

The overall aim of our paper is to examine whether independent and interdependent construal of self can explain delay in accessing medical care in Japan. The purposes of this study are to examine: 1) the contribution of independent and interdependent construal of self to prehospital delay time, after controlling for demographics, medical history, and AMI symptoms; 2) whether independent and interdependent construal of self and prehospital delay time is mediated by cognitive or emotional responses during care-seeking; and 3) whether independent or/and interdependent construal of self independently predicts a visit to a clinic/small hospital which does not provide continuous cardiac care prior to admission to a hospital with continuous cardiac care.

METHODS

Clinical Sites and Medical Care System in Japan

A prospective cross-sectional study was conducted in Japan. Data were collected in 2002 at three hospitals located in Aichi prefecture and two hospitals in Tokyo. All clinical sites in the present study were able to provide cardiac catheterization and continuous cardiac care around the clock. The capacity of inpatient-beds ranged from 150 beds to 1260 beds in these medical institutions, which qualified them as either secondary or tertiary emergency medical facilities. On average, patients admitted with AMI stayed 16 days in the hospital.

To understand the trajectory of care-seeking by patients in the current study, it is important to describe several characteristics of the Japanese medical care system. All Japanese are covered by universal health insurance and are free to choose any medical institution for their care (Okimoto, 1993). To visit ambulatory clinics or small hospitals, an appointment is usually not required. Some patients with evolving cardiac symptoms visit these medical institutions, instead of calling an ambulance. These patients are usually transferred to a hospital with a cardiac catheterization laboratory, since ambulatory clinics or small hospitals do not usually provide any kind of continuous cardiac monitoring or reperfusion therapy. Occasionally, patients may receive one bolus infusion of a thrombolytic prior to transfer. Unlike the U.S., primary angioplasty is the major reperfusion therapy for AMI in Japan (Watanabe, 2001).

Patient characteristics

Inclusion criteria for the present study were the following: 1) mental alertness, 2) Japanese speaker, 3) hemodynamic stability, 4) independent living, 5) no history of advanced malignancy or other debilitating illness, 6) hospitalization within 72 hours after the onset of symptoms, 7) diagnosis of AMI. The AMI diagnosis was based on the consensus of the Joint European Society of Cardiology/American College of Cardiology Committee (2000).

Two hundred fifty-eight patients with AMI were consecutively admitted to one of the hospitals during the data collection period. Thirteen patients refused to participate in the study primarily due to their physical condition. One hundred patients did not meet at least one inclusion criteria. Specially, 34 patients were hemodynamically unstable; 34 patients were not mentally alert; 10 patients arrived at the hospital with symptom onset greater than 72 hours; 6 patients died before they could be approached; 5 patients were not living independently; 4 patients had a severe hearing or/and speaking problem; and the remaining 7 were excluded for other reasons. The remaining 145 patients comprise the sample for the present study.

Procedures

The investigators received approval from the Institutional Review Boards at all clinical sites and the University of California San Francisco prior to data collection. A nurse or a physician in each clinical site informed the researchers when new AMI patients were admitted. Permission to approach a patient was obtained from the patient's physician and/or nurse. After written informed consent was obtained from the patient, the patient interview was conducted by one of two nurses with a master degree and with experience in cardiac patient care. The patient interview was conducted as soon as possible after the patient became hemodynamically stable in order to obtain accurate information. The average time until interview was 3.6 days (SD 1.7 days) from the time of hospital admission. After patients were discharged from the hospital, a medical chart review was conducted to collect clinical date.

Measures

Prehospital delay time and clinic visit

Since the majority of clinics or small hospitals did not provide any reperfusion therapy to the patients who had an evolving AMI (Fukuoka et al., prepared), prehospital delay time was defined as time duration from symptom onset to arrival at a hospital which provided reperfusion therapy and continuous cardiac care around the clock. The date symptoms started was categorized into either weekends/holidays or weekdays. The time of onset of symptoms was divided into four categories (00:00 to 05:59, 06:00 to 11:59, 12:00 to 17:59 and 18:00 to 23:59). Information regarding a clinic/small hospital visit was obtained from the medical chart review and confirmed with the patient.

Sociodemographic and medical history

Age, gender, highest education level, annual household income, marital status, and employment status were assessed by medical chart review and patient interview. Medical histories, including previous cardiac events, diabetes mellitus, smoking, hypertension, overweight/obesity, hyperlipidemia, and sedentary life style, were obtained from the medical record.

Modified Response to Symptoms Questionnaire

The Response to Symptoms Questionnaire contained questions regarding social context in which symptoms first started, antecendents of symptoms, and behavioral, cognitive and emotional responses during an evolving AMI (Burnett, 1995). This questionnaire was modified by Dracup and Moser (1997) and later it was translated from

English to Japanese and back translated (Dracup et al., in print). It was used in a Japanese AMI sample in a previous study.

The responses were evaluated by each item. Rating scales from 1 "not at all" to 5 "very much" were used in 12 of 18 items. The remainder of the items were in the form of multiple choice questions. Since we were particularly interested in cognitive and emotional responses, a principle component factor analysis was used to determine which of 9 cognitive and emotional response items were clustered together (see Table 1). A three-factor solution emerged using a varimax rotation. The responses of "Did not recognize symptom as heart related", "Did not know the symptoms of a heart attack", and "Did not realize symptoms were important" loaded onto the first factor and accounted for approximately 37% of variance. The first factor represented *interpretation of symptoms*. The responses of "thought serious" and " felt anxious" loaded onto the second factor and accounted for approximately 20% of variance. The second factor represented *perceived severity*. The responses of "embarrassed to get help," "felt afraid," and "did not want to trouble others," loaded onto the third factor and accounted for 13% of variance. The third factor represented *concern*. The response of "felt control" did not load onto any of the three factors. Scores for each of these factors were computed by sum of scores. Cronbach's alpha values for the first, second and third factors were .90, .86, and .58, respectively.

Independent and Interdependent Construal of Self

The Independent and Interdependent Construal of Self (short version) involves two dimensions, independence and interdependence (Gudykunst et al., 1996). Sample items reflecting interdependence are "I sacrifice my self-interest for the benefit of my group," and "I respect the decisions made by the group." Each subscale consists of 6 items. The response to each item uses a 7-point Likert-type scale, from 1 " strongly disagree" to 7 "strongly agree." The possible score ranges from 6 to 42 in each subscale. A higher score in one of the subscales indicates a tendency towards either independence or interdependence construal of self. Both subscales were previously tested in 753 college students in four different countries (Korea, Japan, Australia, and the United States) (Gudykunst et al., 1996). The subscales were consistently reliable across four different ethnic groups. In the present study, the Cronbach alphas for the Independent and Interdependent subscales were 0.68 and .062.

Anxiety subscale of the Brief Symptom Inventory (BSI)

The anxiety subscale of the BSI contains 6 questions that measure anxiety state. Those questions are: 1) nervousness or shakiness inside, 2) suddenly scared for no reason, 3) feeling fear, 4) feeling tense or keyed up, 5) spells of terror or panic, and 6) feeling so restless I could not sit still (Derogatis & Melisaratos, 1983). Each item was rated on a 5 point scale of distress (0 "not at all" to 5 "extremely."). The sum of 6 items was calculated and then the mean of items was calculated. The range of possible mean scores in the anxiety subscale was from 0 to 5. Normative values for the anxiety subscale are 0.35 ± 0.45 (mean + SD) (Derogatis & Melisaratos, 1983). The Anxiety Subscale was translated from English to Japanese and back translated. It was used with Japanese AMI patients in a previous study (Moser et al., 2003). Cronbach alpha coefficient of the 6-item anxiety subscale was .83 in this sample. Construct validity in the present study was examined through principal component analysis and revealed that the first principal component explained 54% of the variance. All item loadings were between .60 and .84.

Therefore, the anxiety subscale of the BSI had good reliability and construct validity in Japanese patients with AMI. Patients were asked about their highest anxiety level prior to hospital arrival after symptom onset.

Statistical analysis

The distribution of prehospital delay times was positively skewed. Thus, all statistical analyses were performed on log transformed prehospital delay times. Probability values less than 0.05 were identified as statistically significant. The Pearson r correlation coefficient was used to examine the association between prehospital delay times and variables expressed as interval data such as age, symptom severity, independent and interdependent construal of scores, and cognitive and emotional response scores. Spearman's rho was used to analyze the association between the prehospital delay time and rank order variables.

Main Analysis

Prior to multiple regression analyses, histograms of standardized residuals and normal probability plots were obtained to compare the distribution of standard residuals to a normal distribution. A hierarchical multiple regression was performed to examine whether patient's independent and interdependent levels independently predicted prehospital delay time, after controlling for demographics (age and gender), medical history (diabetes mellitus), symptoms (symptom severity and diaphoresis), and social context (date and time symptom started) (See test 1 in Figure 1).

Mediator Effect

To examine whether the relationship between the Independent or Interdependent Construal of Self and prehospital delay time was mediated by cognitive and emotional responses, the following three criteria needed to be met (Baron, 1986);

a) Independent variables (Independent/Interdependent Construal of Self) should significantly predict mediators (BSI anxiety scores, symptom interpretation, concern, or negative feeling for seeking help) (test 2 in Figure 1),

b) The mediators (BSI anxiety score, symptom interpretation, concern, and negative feeling for seeking help) should significantly predict the dependent variable (prehospital delay time) (test 3 in Figure 1) and

c) When both the mediators and independent variables were in a linear regression model, a previous significant relationship between independent (Independent /Interdependent construal of self) and dependent (prehospital delay time). variables should be no longer significant or effect size should be reduced.

Predictors of a clinic/small hospital visit

A multiple logistic regression was performed to determine whether a patient's independent and interdependent levels independently predicted a clinic/small hospital visit, after controlling for demographics, medical history, symptoms, and social context.

RESULTS

The median prehospital delay time was 3 hours and 34 minutes for the 145 patients hospitalized with AMI. The distribution of prehospital delay times is shown in Table 2. Only 12% of patients arrived at a hospital within one hour after onset of symptoms. Approximately 46% of patients (n=66) called 119 (emergency medical system phone number in Japan), and 52.4% (n=76) of patients went to a clinic/small hospital that did not have a cardiac catheterization laboratory and then were transferred to a hospital.

Independent Variables

Patient Characteristics

The average age was 62 (SD 11) years, with a range from 32 to 88 years. Approximately 87% (n=126) were male; 79.3% (n=115) were married; 44.8% (n=65) lived with more than 3 family members; 30.6% (n=44) had a college or higher level educational degree; and 56.5% (n=82) earned greater than or equal to $33,000 (¥4,000,000) annually. Fifty four percent of patients smoked and 56% of patients had a history of hyperlipidemia. Twenty-nine percent had diabetes mellitus and 43.4 % had hypertension. Approximately one-fourth of patients were not physically active. None of these sociodemographic variables or cardiac risk factors was associated with prehospital delay time ($p > .05$).

Clinical Symptoms

The average severity of symptoms was 8.1 (SD2.1) on a 0-10 scale. The most often reported symptoms were chest discomfort/pain (95.2%), diaphoresis (64.1%), shortness of breath (28.3%), and weakness/fatigue (18.6%). However, only severity of symptoms and diaphoresis were associated with prehospital delay time (Pearson correlation $r = -.27$, $p=.001$; Spearman's rho = - .28, $p=.001$).

Time and date symptoms started

Approximately 35% of AMI's occurred on weekends or holidays. The percentage of patients who experienced onset of symptoms at various time intervals of the day were as follows: 5:00 to 10:59, 34.5%; 11:00 to 16:59, 21.4%; 17:00 to 22:59, 26.9%; and 23:00

to 4:59, 17.2%. Neither day of the week (weekend/holidays vs. weekdays) nor time symptoms started were related to prehospital delay time.

Independent and Interdependent Construal of Self

The average independent and interdependent construal of scale scores were 33.2 (SD $\pm$ 4.0) and 29.4 (SD $\pm$ 4.4), respectively. No reciprocal association was seen between the independent and interdependent construal of self scores (Pearson correlation r = .056, p=.511). The interdependent construal of self score was positively associated with the prehospital delay time (Pearson correlation r = .18, p=.035), while independent construal of self scores were not associated with prehospital delay time (Pearson correlation r = .16, p=.068).

Main Analysis

Table 3 shows the hierarchical multivariate regression on the prehospital delay time (test 2 in Figure 1). The overall model explained approximately 24% of the variance in prehospital delay time (F =4.65, p < .001). In step 3, independent and interdependent construal of self scores significantly predicted prehospital delay time, after controlling for age, gender, diabetes mellitus, time and date symptoms started, severity of symptoms, and diaphoresis. (R square change =.055, F change = 4.69, p = .011). The independent score was negatively associated with prehospital delay time (p = .038), while the interdependent score was positively associated with prehospital delay time (p = .017). Independent and interdependent scores accounted for 2.6% and 3.4%, respectively of the unique variance in prehospital delay time.

Mediator Effect

a) Independent variables ➔ Mediators

The average mean scores in symptom interpretation and in perceived severity were 9.13 (SD3.93) and 6.01 (SD2.47), respectively. The average mean score in BSI Anxiety Subscale was 0.87 (SD.84) in this sample. Table 4 shows the results of tests of association between the Independent/ Interdependent Construal of Self and symptom interpretation, perceived severity, and BSI Anxiety Subscale scores, using Pearson coefficient. Except for BSI Anxiety Subscale scores, there were no associations between the independent variables and mediators ($p > .05$). Thus, symptom interpretation and perceived serious cannot be considered mediators.

b) Mediators➔ Dependent variables

Table 5 shows the results of the Pearson Coefficient tests between dependent variables and mediators. Both *symptom interpretation* and *perceived severity* were significantly associated with prehospital delay time ($p <.05$), while anxiety was not.

In sum, given these reported results, no mediators were associated with both independent and dependent variables. Thus, the relationship between the independent or interdependent construal of self and prehospital delay time was not mediated by cognitive and emotional responses.

Overall Multivariate Regression Model

Since *symptom interpretation* and *perceived serious* were significantly associated with prehospital delay time, these two factors were added to the main analysis as independent variables. Table 6 shows the results of the analysis. The overall model explained approximately 32% of the variance in prehospital delay time ($F = 5.30$, $p < .001$). The independent score was no longer associated with prehospital delay time ($p = .093$), while the interdependent score was still significantly associated with prehospital delay time ($p = .011$). *Symptom Interpretation* on the part of the patients, accounted for approximately 6% of the unique variance in prehospital delay time, which was the largest unique contribution among the variables studied.

Multivariate Logistic Regression on a Clinic Hospital Visit

Table 7 summarizes the results of a multivariate logistic regression analysis using the patients' choice of a clinic /small hospital as the dependent variable. After controlling for age, gender, date and time symptoms started, severity of symptoms, and presence/absence of diaphoresis, patients with higher independent scores were less likely to visit a clinic/small hospital than those with lower independent scores ($p =.004$). However, interdependent scores did not predict a clinic/small hospital visit ($p > .05$).

DISCUSSION

Prehospital Delay Time

In the present study, the median prehospital delay time, 3 hours 34 minutes, was longer than most large-scale US studies indicate. More than 40 % of patients arrived at a hospital beyond the therapeutic window of 6 hours after symptom onset. Only 45% of patients called 119, while approximately 50 percent initially sought care at a clinic or small hospital that did not have continuous cardiac monitoring. Therefore, the importance of using an ambulance and not first visiting a clinic needs to be incorporated into health education in Japan, particularly for patients at high risk for AMI.

Similar to other study findings (Dracup & Moser, 1997; Goldberg et al., 2002; Group, 1995; Kenyon, Ketterer, Gheorghiade, & Goldstein, 1991) increased symptom severity and presence of diaphoresis were significantly related to reduction of prehospital delay time. However, although some previous studies reported that older age, female gender, low income, and/or a history of diabetes mellitus or hypertension were associated with an increased prehospital delay time (Dracup & Moser, 1997; Gurwitz et al., 1997; Schmidt & Borsch, 1990), no association was observed in this study. The lack of association may be related to the system of health care in Japan, which is one of universal access, thereby decreasing the salience of such factors as age and income.

Cultural Differences in Care-Seeking Behavior

To our knowledge, this is the first study to examine whether cultural differences (defined as independent and interdependent construal of self) are associated with prehospital delay time during an evolving AMI. We found that an interdependent construal of self was positively related to increased prehospital delay time. Moreover, patients with higher independent construal of self scores were less likely to seek care in a clinic/small hospital, but rather to go directly to a large hospital with cardiac services.

One possible explanation for these findings could be related to the degree of engagement with one's social role within a society. People live in the midst of a complex web of human relationships within a social structure. An individual has a social role within a family, work, and community. Numerous studies suggest that individuals with an independent construal of self are likely to describe themselves in relation to their personal attributes, desires, preferences, or abilities (Markus & Kitayama, 1991) (e.g., "I am talented"). In contrast, individuals with an interdependent construal of self are likely to describe themselves within a social role (e,g., "I am a father or boss"). When individuals with an interdependent construal of self experience cardiac symptoms, they may make an effort to stay in their social role thereby increasing response time unless their symptoms interfere with the performance of social roles or situational commitments. In addition, in order to remain in a social role, an individual might not tell others about his/her cardiac symptoms. Hence, individuals with high interdependence would be more likely to delay in seeking medical help than those with low interdependent construal of self, an interpretation supported in the current study.

A second possible explanation for these observations may relate to the distance of relationships between self and others. Individuals with high interdependent construal of self could develop a high degree of familiarity, intimacy, and trust within a group, called an "in-group." (Matsumoto,1996). These individuals are extremely hospitable, cooperative, and helpful toward their own in-group members and can be rude, exploitative and even hostile toward individuals perceived as belonging to their out-group. In this area of interpersonal relationships, individuals with an interdependent construal of self may begin seeking help or advice with in-group members when experiencing cardiac symptoms (Figure 2). First seeking help from the in-group instead of going to an emergency room could lead to a longer time lapse from symptom onset to arrival at a hospital.

Individuals with an interdependent construal of self tend to make a decision based on group consensus, while individuals with an independent construal of self tend to make a decision by themselves. One Japanese study examined the desirability to participate in psychiatric medical decision-making in relation to the degree of independent and interdependent construal of self in 747 healthy university medical students. The students who wished to know all medical information had higher independent scores compared to those who did not wish to know even one item of medical information (Hasui et al., 2000). Another study found that individuals with interdependent construal of self preferred to have medical decisions made by a physician and by the family, while those with independent construal of self preferred to make decisions by themselves (Kim, Smith, & Yueguo, 1999).

A few studies have reported a relationship between seeking psychiatric or psychological help and independent or interdependent construal of self (Barry & Grilo, 2002; Yeh, 2002). For example, one study reported a positive association between an independent construal of self and a willingness to recommend psychological services to friends, while there was no association between an independent construal of self and a willingness to seek psychological service themselves (Barry & Grilo, 2002). Another study measured the attitudes toward seeking professional psychological help in relation to independent and interdependent construal of self in junior high, high school, and college students in Taiwan. One of the findings was that the interdependent construal of self, as well as female gender, was positively associated with attitudes about seeking professional psychological help (Yeh, 2002). However, caution needs to be exercised in comparing these findings to our study findings. First, these studies recruited healthy and relatively young participants (mainly students), and used a hypothetical scenario to measure the tendency to seek professional mental health treatment. Intention does not necessarily predict behavior. Second, a stigma toward seeking psychological help still remains in some countries, while seeking care for cardiac symptoms may be less stigmatized. The care-seeking patterns in patients with acute illness need to be further tested using the concept of independent and interdependent construal of self.

Mediator effect

In the present study, the relationship between independent/interdependent construal of self and prehospital delay time was not mediated by cognitive and emotional responses. However, the patient's interpretations of symptoms as serious and as cardiac in nature were significantly associated with prehospital delay time. These findings may imply the following: First, a methodological issue related to the timing of patient's interview needs to be considered. Although patients were interviewed on average 3.6 days after hospital admission, they may have minimized the degree of cognitive and emotional responses they experienced while they had symptoms. Second, when patients were interviewed at the hospital, they were already free from their usual social context or role. However, if patients were asked about their cognitive and emotional responses at the moment of experiencing cardiac symptoms, they might report different results. Third, although we did not find a mediator effect in this study, there is still a possibility that cognitive and emotional responses might mediate prehospital delay time in relation to other factors, such as type or severity of symptoms and social context.

Limitations

Our ability to generalize the results to all AMI patients is limited for several reasons. First, in this study cultural differences in treatment seeking behaviors were tested only within a sample of Japanese AMI patients. Our results may not be applicable to different cultural groups or people with illnesses other than AMI. Second, patients were older and recruited in hospitals in urban areas in Japan. Younger people and/or people living in rural areas could be more or less independent than older people living in urban areas (Matsumoto, 2002). Third, approximately 40% of patients who were admitted to a hospital were excluded from the study, and others died outside of the hospital. It is estimated that approximately one third of patients with AMI died before they reached a hospital. Thus, these findings may not be representative of all patients with AMI.

Recommendations for future research

This was the first study to examine prehospital delay time in relation to the concept of independent/interdependent construal of self. Future studies need to replicate these results in Japan, as well as in other cultures so that outcomes can be compared within the same cultural group and across cultural groups. Globalization (e.g. living and traveling abroad, immigration, accessing mass media and internet) provides us more opportunities to be exposed to different cultures (Cooper & Denner, 1998). As a result of globalization, more variations within a single culture may be observed in the future, while less difference may be observed across cultures. Understanding care-seeking patterns from a social-cultural perspective could help us develop culturally appropriate interventions to promote early access to treatment.

Acknowledgement

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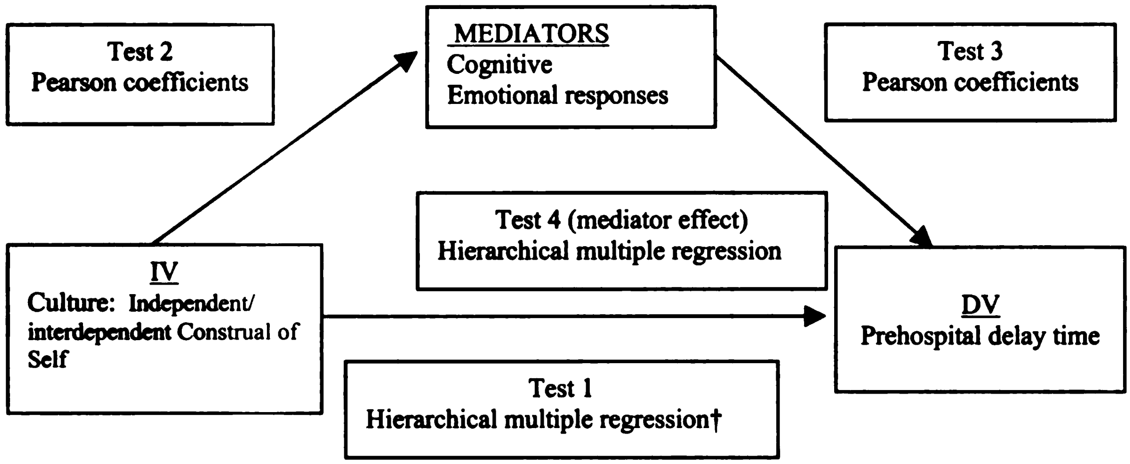
Figure 1. Analysis plan for research question 1



† In step 1 age, gender, and diabetes mellitus were entered, in step 2 symptom severity, diaphoresis, date and time of symptom onset, and in step 3 Independent and Interdependent Construal of Self were entered.

Table 1 Factor loading in Principle component Analysis with Varimax rotation

Cognitive and emotional response items in RSQ	Factor 1	Factor 2	Factor3
1. When you first experienced your symptoms how serious did you think they were?	-.290	**.843**	.090
2. How anxious (distressed or upset) were you by your symptoms when you first noticed them?	-.191	**.853**	.151
3. How much ability to control your symptoms do you think you have?	-.075	-.651	.310
4. Delayed because your were embarrassed to get help	-.072	-.091	**.728**
5. Delayed because your feared what might happen	.130	.143	**.631**
6. Delayed because you did not recognize your symptoms as heart symptoms	**.875**	-.258	.117
7. Delayed because you did not want to trouble anyone	.102	-.070	**.790**
8. Delayed because you did not know the symptoms of a heart attack	**.894**	-.184	.115
9. Delayed because you did not realize the importance of your symptoms	**.974**	-.121	.159

RSQ : Response to Symptoms Questionnaire
Factor 1 was termed symptom interpretation; Factor 2 was termed perceived severity; and factor 3 was termed concern

Table 2. Distribution of Prehospital Delay time (N=145)

Delay time (hours)	Percent	n
0 - ≤1	12.4	18
1 - ≤2	17.2	25
2 - ≤ 6	35.2	51
6 - ≤ 12	13.2	19
12 - ≤ 72	22.1	32

Table 3 Hierarchical multiple regression for prehospital delay time (N=139)

Steps & IVs	R^2	F change	Step 1 ß/SE	Step 2 ß/SE	Step 3 ß/SE	p for step 3
Step 1	.052	2.45				
Age,			.008/.005	.006/.004	.006/.004	.132
Gender			.152/.146	.135/.137	.015/.141	.918
Diabetes mellitus			.171/.102	.197/.096*	.176/.094	.064
Step 2	.188**	5.51				-
Time †				.032/.038	.058/.038	.133
Day ‡				.164/.098	.152/.090	.095
Symptom severity				-.058/.022*	-.065/.022**	.004
Diaphoresis				-.233/.098*	-.214/.097*	.029
Step 3	.243*	4.65				-
Independent					-.024/.012*	.038
Interdependent					.024/.010*	.017

† Midnight to 5:59 am, 6am to 11;59 am, noon to 5:59 pm and 6pm to 23:59 pm Symptoms started ; ‡ Weekdays and weekends/holidays symptoms started; * $p < .05$, ** $p<.001$

Table 4 Pearson Coefficient r between independent variables and mediators (p value)

Independent variables	Mediators			
	BSI anxiety	Symptom interpretation	Perceived severity	Concern
Independent Construal of Self Scores	-.02(.84)	-.09(.32)	.09 (.30)	.02 (.82)
Interdependent Construal of Self Scores	**.26 (.002)**	.01 (.88)	.09 (.29)	.05 (.54)

Table 5 Pearson Coefficient r between dependent variables and mediators (p value)

Dependent variables	Mediators			
	BSI anxiety scores	Symptom interpretation	Perceived severity	Concern
Prehospital delay time	-.02(.82)	**.29(.001)**	**-.23(.006)**	.142 (.092)

Table 6 Multiple regression for prehospital delay time (N=139)

Steps & IVs	R^2	F change	ß	SE	sr^2	p
	.316	5.295				<.001
Age,			.008	.004	-	.063
Gender			.035	.136	-	.797
Diabetes mellitus			.146	.091	-	.110
Time †			.069	.037	-	.065
Day ‡			.124	.089	-	.164
Symptom severity			-.049	.023	**.026**	**.030**
Diaphoresis			-.256	.096	**.039**	**.008**
Independent			-.019	.011	-	.093
Interdependent			.025	.010	**.036**	**.011**
Symptom interpretation			.038	.012	**.057**	**.002**
Perceived serious			-.006	.020	-	.771

† Midnight to 5:59 am, 6am to 11;59 am, noon to 5:59 pm and 6pm to 23:59 pm Symptoms started ;

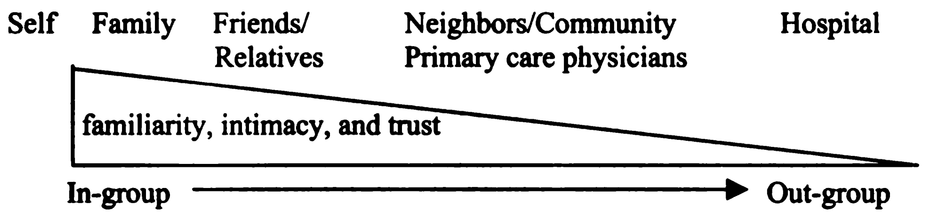
‡ Weekdays and weekends/holidays symptoms started;

Table 7 Multiple logistic regression on a clinic/small hospital visit (n = 139)

Predictors	Odds ratio	95% CI
Age	1.04	1.00 -1.08
Female sex	.48	.14 -1.63
Diabetes mellitus	1.42	.64 - 3.19
Weekend/holidays	1.08	.49 -2.39
Symptom onset time		
06:00 am – 11:59 am	1.57	.53 - 4.67
12:00 pm – 5:59 pm	.78	.24 -2.48
6:00 pm –11:59 pm	.56	.18-1.77
Absence of diaphoresis	1.22	.52 - 2.85
Symptom Severity (≤ 7)	3.39	1.43 - 8.00
Independent score	.85	.77 -.95
Interdependent score	1.06	.98 -1.16

Reference categories: age in one year increment, male sex, absence of diabetes mellitus, weekdays & Time between 00:00 am - 5:59 am symptoms started, presence of diaphoresis, symptom severity > 7, and independent and interdependent construal of self in one score increment

Figure 2. The model of help-seeking processes from in-group to out-group in Japan



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CHAPTER FOUR

Illness attribution among Japanese patients with acute myocardial infarction

Abstract

OBJECTIVE : To describe causal attribution of acute myocardial infarction (AMI) in Japanese patients.

DESIGN : Cross-sectional study

SETTING : 5 hospitals in urban areas in Japan

SAMPLE : A convenience sample of 155 patients admitted with AMI

MEASURES: Causal attribution was assessed by a semi-structured interview. Known risk factors were assessed by medical record review and patient interview.

RESULTS : 22 different primary causes for AMI were identified. Patients most commonly cited smoking, stress, and diet as risk factors. Except for smoking, Japanese patients did not identify their cardiac risk factors as a cause of their AMI. Controlling for sociodemographic characteristics, patients with a recorded history of coronary heart disease were significantly less likely to attribute their cardiac risk factors to their AMI ($p < .05$).

CONCLUSIONS: Effective education and counseling of patients after an AMI needs to be coupled with their view of what factors put them at risk for future AMIs.

INTRODUCTION

Acute myocardial infarction (AMI) is a life-threatening experience for patients. After their diagnosis, many patients immediately seek a causal explanation of their AMI to help them make sense of their illness and gain a sense of control over the uncertainty that attends any sudden threat to survival. [1] Illness attributions are the inferences people draw upon to form a causal explanation for their disease, representing the way people understand their illness. [2] Personal experience, social norms, and cultural milieu shape a patient's illness attributions (see Figure 1). Individuals from different socio-cultural backgrounds may differ in their attributions. Moreover, psychological responses such as anxiety, denial, and depression, which are frequently seen in patients with AMI, can interact with the causal attribution processes. [3,4]

In order to provide effective and culturally appropriate education and counseling for patients following an AMI, it is important to understand how patients identify possible causative factors. The purpose of this study was 1) to identify the factors that patients perceive as the cause of their AMI, 2) to determine if those patients who had known cardiac risk factors accurately identified them as a possible cause for their AMI, and 3) to determine whether a recorded history of coronary heart disease (CHD) independently predicts identification of cardiac risk factors after controlling for age, gender, income, education, and marital status.

BACKGROUND

Although patients usually possess general knowledge about cardiac risk factors, they may not interpret their own cardiac risk factors as a cause of their AMI. The goal of patient education and counseling following AMI is to minimize the risk for secondary cardiac events by helping patients control or reduce known cardiac risk factors. Knowing patients' illness attributions is critical for health care providers, because changes in patient behavior related to cardiac risk factor modification and recovery can be predicted by the patient's illness attribution. For example, Petrie and colleagues examined the association between illness perception at admission for a first AMI and health outcomes 3 and 6 months later in 143 patients under the age of 65.[5] The investigators reported that patients who believed that their AMI could be controlled or cured were more likely to attend cardiac rehabilitation.

Gilutz and colleagues evaluated causal attribution of AMI in 87 Israeli and 98 Swedish patients. After controlling for age, education, depression, and disease severity, they found that patients who attributed uncontrollable factors (fate and luck) to AMI had significantly lower rehabilitation outcomes (return to work and functional status) 6 months later.[6] Another study also investigated the association between patients' causal attribution during hospitalization and behavior change after 3 and 6 months.[7] Patients who believed that smoking or being overweight contributed to their AMI, significantly improved their health behaviors through actions such as quitting smoking and losing weight after AMI. However, attributing their AMI to an unhealthy diet or lack of exercise was not a predictor of risk reduction such as improving diet or increasing exercise, two behaviors that are consistently difficult for patients to change after AMI.[7] In sum, while patient attribution during the hospital stay does not always predict behavior change, research findings suggest that patients who attribute their AMI to modifiable factors are more likely to change their health behaviors following hospital discharge than patients who attribute their AMI to non-modifiable factors such as fate or genetics.

Illness attribution has been extensively investigated in Western countries. However, to date, little research has been done in Asia, particularly in Japan. Japanese causal attribution to AMI may differ from Western causal attribution for two reasons. First, the incidence of AMI in Japan is relatively low compared to other industrialized countries,[8] and therefore public education program has not emphasized prevention of CHD. As a result, Japanese patients might not be aware of cardiac risk factors. Second, in Western society, people frequently attribute illness to personal factors, such as diet, lack of exercise, overweight, and stress. In contrast, in non-Western societies, such as Japan, people are more likely to view illnesses as caused by interpersonal and supernatural etiological factors, such as fate, luck, nature, or superstition.[9] Matsumoto and colleagues reported cultural differences in attribution of osteoporosis causality between Japanese American women who were born and raised in Japan (first generation) and Japanese American women born and raised in the United States (second generation).[10] First generation Japanese American women were more likely to attribute osteoporosis to fate or luck, while second generation Japanese American women were more likely to acknowledge that diet played a key role in the development of osteoporosis. These results reflect the effect of cultural differences on illness attribution, perhaps influenced by better education about the underlying causes of disease.[10] Thus, a different cultural environment may uniquely shape Japanese patients' causal attribution of AMI.

We therefore conducted a study in Japanese patients immediately after AMI while they were still in the hospital, to describe their illness attribution, particularly as it related to their cardiac risk factors. We also examined the relationship between a history of CHD and illness attribution to determine if having a history of CHD increased the accuracy of illness attribution following an AMI.

METHODS

Sample

A cross-sectional design was utilized in this study. A convenience sample of 155 patients admitted to one of five hospitals in Japan was recruited. Data were collected from January to August 2002. To be included, patients had to be 1) mentally alert, 2) able to speak Japanese, 3) hemodynamically stable, 4) no history of advanced malignancy or other debilitating illness, and 5) have a diagnosis of AMI. The diagnosis of AMI was based on elevated cardiac enzyme levels, and at least one of these other criteria: 1) a history of ischemic symptoms, 2) development of pathologic Q waves on the electrocardiogram (ECG), 3) ECG changes indicative of ischemia (ST segment elevation or depression), and/or 4) coronary artery intervention (e.g. coronary angioplasty).[11]

Procedure

Institutional Review Board approval for protection of human subjects was obtained from the University of California San Francisco and all clinical sites before researchers made contact with patients. A researcher approached patients who met inclusion criteria following consultation with the patient's physician and nurse. The researcher explained the study and obtained written informed consent. Although the average length of hospital stay in AMI patients was 16 (SD 11) days in these five hospitals, all patients were interviewed within 7 days of hospital admission. The average time that elapsed from hospital admission to interview was 3.6 (SD 1.7) days. Based on the procedures of the participating hospitals, formal education for cardiac risk reduction was conducted a few days before discharge and therefore followed participation in the current study. However, the researchers were unable to prevent patients from receiving information regarding their cardiac risk factors from cardiologists or clinical nurses prior to participating in the study and it was not possible to monitor the amount of information provided.

One of two interviewers, an investigator and a research assistant, performed the patient's interview in this study. Prior to data collection, the research assistant attended a two-day training session. All patient responses were coded, and all data entries were performed by a single investigator after the interview.

Measures

Sociodemographic and cardiac risk factors

Sociodemographic factors (age, gender, education, marital status, and income) and cardiac risk factors (smoking, physical inactivity, being overweight or obese, hypertension, diabetes mellitus, hyperlipidemia, and family history of CHD) were obtained through medical record review and interview. Smoking was defined as either current smokers or non-smokers (non-smokers included former smokers). Overweight or obese was defined as a body mass index (BMI) ≥ 25 kg/m^2.[12] Physical inactivity was defined as less than 30 minutes of exercise twice a week or less. For the logistic regression model, age was dichotomized as being old ($\geq$ 60 years) or young (< 60 years) using the median value. In addition, the patient's educational level was categorized as $\geq$ college or < college.

Patients' causal attribution of AMI

Patients' causal attribution was assessed by two open-ended questions: "What do you think caused your heart attack?" and "Please list three possible causes of your heart attack from most to least likely." If patients could not list any causes, the interviewer encouraged patients to "list anything you can think may have caused your heart attack." During the interview, patient responses were recorded by paper and pencil. Because little research in the area of Japanese patient's causal attribution of AMI exists, investigators used an open-ended question instead of providing a list of known cardiac risk factors.

Statistical analysis

SPSS version 11 for Windows was used for data analysis. Frequency, measures of central tendency, standard deviations, and percentiles were used to describe the sample characteristics, cardiac histories, and patients' reported causal attribution. A multivariate logistic regression was used to examine whether a recorded history of CHD would independently predict the patient's identification of known cardiac risk, controlling for age, gender, education, and marital status. A two-tailed level of significance was set at alpha level ≤ 0.05.

RESULTS

Patients' characteristics

The sociodemographic characteristics of patients are described in Table 1. The average age was 62 years old, with a range from 32 to 86 years old; 86.5% were male; 78.2% were married; 30.5% had a college or higher level education; 59.4% earned greater than or equal to $33,333 (¥4,000,000) annually. The average household income was approximately $54,000 (¥6,480,000) in Japan in 2002.[13] More than half of the participants smoked and had a history of hyperlipidemia. Forty- five percent of patients had a history of hypertension and 40% were overweight or obese (BMI $\geq$ 25 kg/m^2). The majority of patients were not physically active.

Primary causal attribution

Patients' responses to the question "list three possible causes from most to least important" are presented in Figure 2. Approximately 10% of patients (n=15) were unable to identify any cause of their AMI. Approximately 32% and 27% of patients were not able to report a second and a third cause, respectively.

Table 2 shows the summary of the reported primary causal attribution of AMI. Twenty-two different types of causes were reported by 155 patients. Smoking was the most frequently reported possible cause of AMI, and approximately one fifth of participants identified smoking as the primary cause of their AMI. Sixteen percent identified stress as the primary cause while 13.5% cited diet as a primary cause of AMI. Eighty percent of patients who identified stress as the primary cause of AMI reported their job as the main factor contributing to their stress, while 20 % reported that personal relationships and family issues were their primary sources of stress. Patients who identified diet as the primary cause of their AMI identified several different dietary patterns as causative. The most frequently reported answers were "I ate too much salt" (24%), "I ate too much oily food (e.g. tempura)" (24%), and "I ate meals irregularly or ate out a lot (24%)." Fifteen percent reported that eating sweets or fruit caused their heart attack. Only 1.3% attributed their AMI to cold weather and 0.6% attributed it to being unlucky.

Patient identification of known cardiac risk factors

To determine if those patients who had known cardiac risk factors accurately identified them as a possible cause for their AMI, we examined the three causes reported by the patients in light of their known cardiac risks. Table 3 summarizes the percentage of patients with positive cardiac risk factors who identified those risk factors as a cause of their AMI. Smoking was the most frequently identified cardiac risk factor. Of 83 patients who smoked, 57.8% (n = 48) identified it as the cause, while 42.2% (n = 35) did not. Among the 45 AMI patients with diabetes mellitus, 37.8% (n = 17) identified diabetes mellitus as the cause of their AMI. Of the 89 patients with hyperlipidemia, 21.3% (n = 19) attributed as the cause of their AMI. The cardiac risk factors of physical inactivity, obesity, hypertension, or positive family history of CHD were rarely identified by patients as cause of their AMI. In sum, except for smoking, the majority of patients did not attribute cardiac risk factors to their AMI.

Predictors of patient's identification of cardiac risk factors

All but 2 patients (98.7%, n = 153) had at least one cardiac risk factor, but 41% (n=63) did not identify any of their cardiac risk factors as the cause of their AMI. In addition, 65% (n = 100) had at least three cardiac risk factors, yet only 6 of these patients attributed their AMI to them. Multiple logistic regression was used to identify factors that predicted patients' ability to list at least one cardiac risk factor appropriately (Table 4). After controlling for age, gender, marital status, and education, patients with a history of CHD were significantly less likely to identify their cardiac risk factors accurately ($p < .05$).

Discussion

Smoking was the most frequently identified primary cause of their AMI reported by these Japanese patients, followed by stress and diet respectively. These findings are similar to previous studies conducted in the United States and Europe. [14-18] However, previous US and European studies reported that stress/tension, as opposed to smoking was the most frequently reported cause of AMI. The high percentage of patients in our study who identified smoking as the cause of their AMI may reflect the high prevalence of smoking in Japan, and recent programs in the media to educate the public about the link between tobacco and heart disease. However, it should also be noted that 42% of the patients who smoked did not recognize it as a causal factor, suggesting that educational campaigns have not been totally effective in raising the awareness of the Japanese public about this relationship.

In this study, approximately 80 % patients reported that the stress they experienced was related to their job with overwork, trouble and tension cited as causes of stress at work. Sudden death from cardiovascular disease related to overwork (termed "Karoshi" in Japanese) has been recognized widely in Japan since the 1970s'. [19] In one study, [20] Japanese AMI patients had worked significantly more hours in the month preceding the AMI than healthy controls (58 $\pm$ 15 hours/week versus 51 $\pm$ 8 hours/week), suggesting that AMI patients might be particularly aware of work stress as a causative factor in AMI. In addition, job stress as a casual explanation of AMI is socially acceptable in Japan, because traditional Japanese work values emphasize hard work, loyalty to one's company, self-sacrifice, and no absenteeism.[21] Patients therefore were likely to identify their job as a source of their stress.

Although patients reported diet as the third most common cause of AMI in this study, it seems that only a few patients understood the association between type of diet and increased risk of AMI. Patients most often identified a salty diet, not a diet high in fat as problematic. The high incidence of cerebral vascular disease and hypertension [8] has led to aggressive public education about the necessity to reduce salt intake in the traditional Japanese diet, which may have led these patients to identify a diet high in salt as a cardiac risk factor rather than a diet high in fat.

Only one patient identified bad luck and two patients identified weather as causes of their AMI, suggesting that Japanese patients are more likely to attribute their illness to their own behavior than to fate. Our finding was in marked contrast to that of Matsumoto and colleagues who found that first generation Japanese American women were more likely to attribute a chronic illness (osteoporosis) to fate or lucks rather than known risk factors.[10] This discrepancy in findings between the two studies may reflect an increasing adoption of Western values, in Japan, particularly related to health issues. Another possible reason for the discrepancy may be methodological. We used an open-ended question, instead of providing a list of possible causes. Patients may not have felt comfortable reflecting on supernatural beliefs if they perceived that it was not a desirable or appropriate answer in a health care setting. [9]

Approximately 10% of patients were unable to list even one cause for their AMI. It may be that they had some general knowledge about cardiac risk factors; they could not make the link between their own behavior and AMI. Moreover, public education campaigns have focused on stroke and hypertension rather than AMI. Thus, some patients might not be aware of cardiac risk factors.

To minimize future cardiac events, patients must take the initial step of acknowledging their own cardiac risk factors. With the exception of smoking and perhaps diabetes mellitus, other known cardiac risk factors were not identified as possible causes of AMI by these Japanese patients. Despite the high prevalence of hypertension in Japanese individuals, hypertension remained unreported as a cause of AMI except for one instance. The results indicate that Japanese patients might not know their own cardiac risk factors. Health risk factors (hypertension, hyperlipidemia, overweight/obesity and diabetes) and public awareness of these risk factors were examined in 15,000 randomly selected Japanese.[8] Among people who were overweight (BMI $\geq$ 25Kg/m^2), 45% of men and 60% of women were aware of being overweight. Less than half were aware of their high blood pressure or hyperlipidemia. In the same study, 26% of males and 13% of females identified their high serum glucose levels as a health risk factor. These results indicate that many Japanese are not aware of their own health risk factors. In addition, probably only a few people have the knowledge that these risk factors could increase their risk of AMI. Public awareness with regard to cardiac risk factors needs to be improved in Japan.

Patients with CHD have both formal and informal education and counseling by health care providers. The discovery that patients with a recorded history of CHD were less likely to attribute their AMI to known cardiac risk factors than patients without a history of CHD indicates that health care providers need to intensify their education efforts. Our findings suggest that patient education following AMI is not as effective as health care providers assume. Several reasons can be hypothesized. First, there might be a discrepancy between patient needs and the education provided by a health care provider during the hospital stay. Most patients would like to know how to respond to an emergency situation, the specific facts about their condition, and the expected course of the disease process.[22] Health care providers may provide education that does not address patients' major concerns. Second, patients often manifest psychological responses, such as depression, anxiety, and denial during the acute phase of AMI,[3,4] and these manifestations can interfere with understanding the information provided by health care providers during and immediately following hospitalization. Third, the patients with a previous AMI were followed by physicians after their first AMI and cardiac risk factors, such as hypertension and hyperlipidemia, were treated with medications. Seeing a physician regularly may have made patients feel that these known cardiac risk factors were well controlled and therefore did not play a role in their second AMI.

Implication for clinical practice and future research

The patients in this study had many different illness attributions, including physiological, psychological, and natural causes. Health care providers tend to focus patient education efforts on physiological causes such as hyperlipidemia, smoking, and obesity. In contrast, patients frequently identified psychological factors such as stress as important causes of AMI.[23] As in previous studies conducted in Western countries, stress was identified as the second most likely cause of AMI by Japanese patients in our study. Thus, health care providers should incorporate stress management into patient education, counseling, and cardiac rehabilitation programs and discuss its role in AMI related to other primary risk factors.

It is important for health care providers to discuss the causes of illness with their patients prior to providing any advice about cardiac risk reduction. For example, a patient might believe stress caused their AMI, when in reality the primary cause of their AMI was smoking, hypertension, and hyperlipidemia. Patients may try to reduce stress while ignoring primary risk factors. Hence, a patient's education and counseling needs to be coupled with a patient's view of illness. Furthermore, health care providers cannot assume that patients with a history of CHD or AMI have a better understanding of cardiac risk factors than patients without such a clinical history.

To our knowledge, this is the first study about causal attribution of AMI in Japanese patients. In order to understand the role of causal attribution in secondary prevention, a longitudinal study needs to be conducted to identify the associations between causal attribution, health behavior and future cardiac events. Incorporating patient's illness attribution into patient education and counseling may improve health behaviors after AMI, but this awaits further testing.

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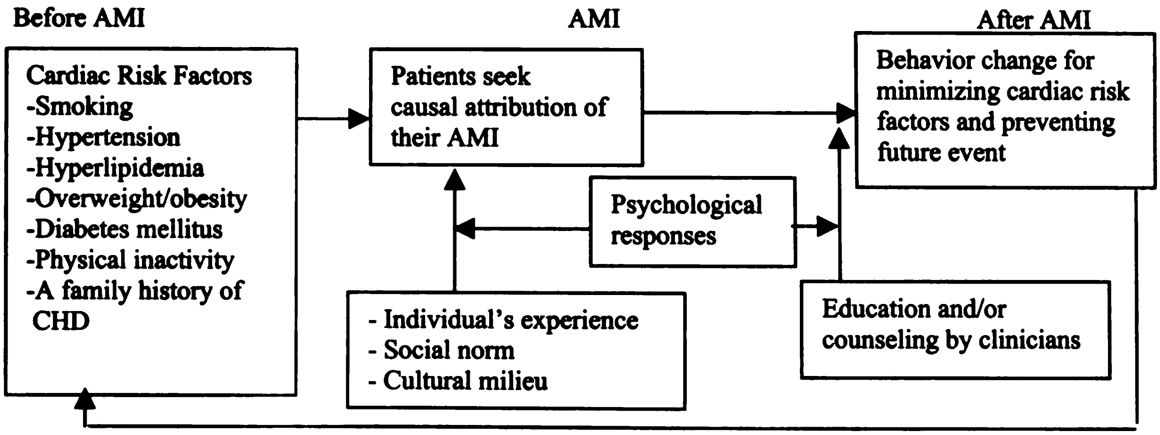

Figure 1. Causal attribution model in AMI

Table1 Sociodemographics in 155 patients with AMI

Characteristic	$\overline{X}$ (SD)
Average age (year)	62.0 (11)
	% (n)
Male gender	86.5 (134)
≥ College education	30.5 (47)
Married	78.2 (122)
≥ 3 family members living with patients	70.2 (33)
Income (≥ $ 33,333)*	59.4 (84)
Full-time or part-time job	63.2 (98)

* $1 = ¥ 120 ; 12 patients refused to answer the question regarding income.

Figure 2 Patients' responses about AMI causality

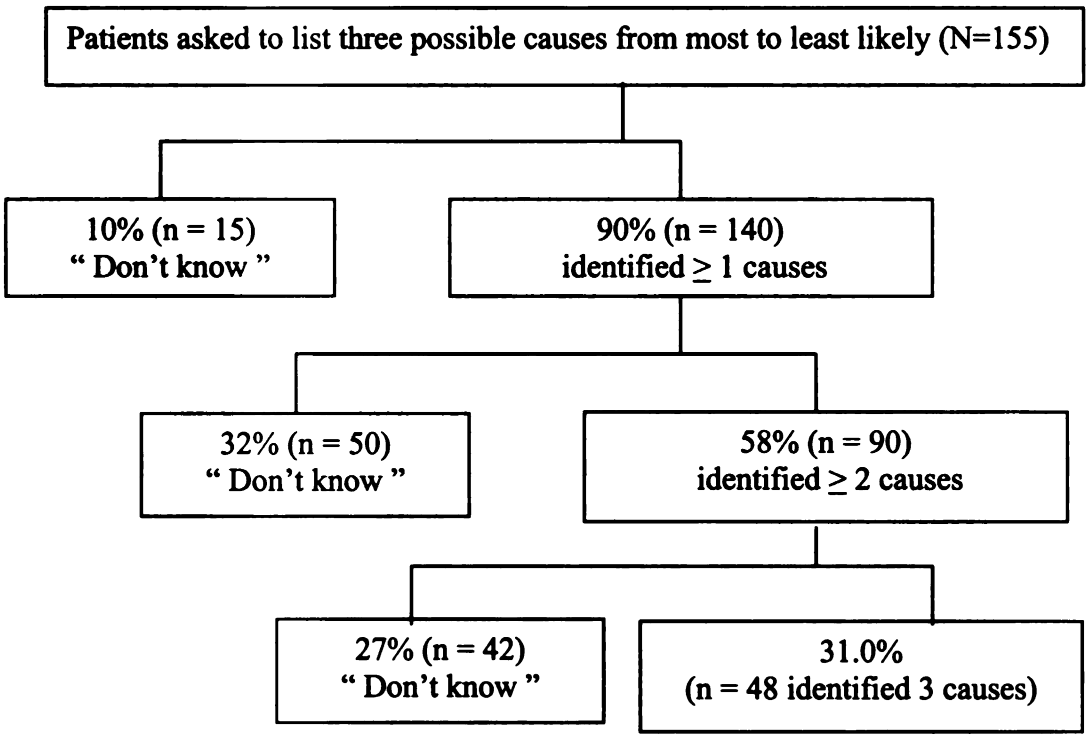

Table 2. Primary cause of AMI reported by patients (N=155) in order of frequency

Cause	% (n)
1. Smoking	18.7 (29)
2. Stress	15.5 (24)
3. Diet	13.5 (21)
4. Diabetes mellitus	7.1 (11)
5. High lipids	5.8 (9)
6. Lifestyle	5.8 (9)
7. Genetics	4.5 (7)
8. Overweight /Obesity	3.2 (5)
9. Aging	3.2 (5)
10. Fatigue	2.6 (4)
11. Physical inactivity	1.9 (3)
12. Cold weather	1.3 (2)
13. Hypertension	1.3 (2)
14. Lack of water intake	1.3 (2)
15. Drank too much alcohol	0.6 (1)
16. Did not take medication regularly	0.6 (1)
17. Personality	0.6 (1)
18. Physically weak	0.6 (1)
19. Unlucky all my life	0.6 (1)
20. Atherosclerosis	0.6 (1)
21. Reocclusion	0.6 (1)
Don't know	9.7 (15)

Table 3 Cardiac risk factors identified by Japanese patients as the cause of their AMI

Cardiac risk factors	% of risk factor (N= 155) % (n)	% who identified risk factor as causal % (n)	% who did not identify risk factor as causal % (n)
Smoking	53.5 (83)	57.8 (48)	42.2 (35)
Diabetes	29.0 (45)	37.8 (17)	62.2 (28)
Hyperlipidemia	57.4 (89)	21.3 (19)	78.7 (70)
Physically inactive	72.9 (113)	8.8 (10)	91.2 (103)
Overweight/obese †	39.0 (60)	15.0 (9)	85.0 (51)
Hypertension	44.5 (69)	7.2 (5)	92.8 (64)
Family history of CHD	32.9 (51)	7.8 (4)	92.2 (47)

†(Body Mass Index $\geq 25kg/m^2$), CHD : coronary heart disease

Table 4. Multivariate logistic regression for correct identification of at least one cardiac risk factor (N=153)

Variables †	Odds ratio	95% CI
Age < 60	1.39	0.70-2.76
Male gender	1.33	0.49-3.59
Married	1.07	0.48-2.40
≥ College education	1.35	0.63-2.94
Positive history of CHD	0.34*	0.15-0.78*

CI = confidence interval; CHD = coronary heart disease; * $p < .05$

† Reference group: ≥ 60 years, female, Not married, < College, no history of CHD

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CHAPTER FIVE

Do Japanese workers who experience an acute myocardial infarction believe their prolonged working hours are a cause?

Abstract

Background: Cardiovascular disease related to excessive work/job stress has been a significant social concern for the Japanese public. Therefore, we conducted a study to explore whether job stress levels in AMI patients differ from healthy participants and, 2) examine the types of stresses and cardiac risk factors associated with patients' causal belief of AMI.

Methods: 47 patients admitted to the hospital with AMI and 47 healthy workers visiting a hospital for their annual physical examination were recruited in Japan. Both groups were employed full-time and matched on age and gender. Cardiac risk factors were assessed by medical chart review. Job stress was assessed by the Brief Job Stress Questionnaire, which consists of 4 subscales: job demand, job control, support from supervisors, and support from coworkers. Causal belief was assessed by a semi-structured interview.

Results: Compared with healthy participants (50.7 $\pm$ 8.6 hours), AMI patients worked significantly longer hours per week (58.3 $\pm$ 15.0 hours) prior to their AMI, but only 38 % reported that job stress might have contributed to their AMI. Compared with AMI patients who did not report that job stress caused their AMI, those 38 % reported experiencing a significantly higher number of acute stressful events in the month prior to their AMI ($p < .05$).

Conclusions: Like other known cardiac risk factors, it is important for clinicians to assess patient's excessive working hours. The education and counseling of patients following AMI must take into consideration the patient's perceived view of job stress.

Key words: Acute myocardial infarction; Japan; Job stress; Karoshi; Overtime.

1. INTRODUCTION

Health problems related to excessive work and occupational stress are a world-wide phenomena [1]. However, Japanese is the only language that contains a word for sudden death due to cardiovascular disease resulting from overwork, *Karoshi.* The term reflects the special issues of work patterns in Japan over the last two decades. Although the Japanese Ministry of Health, Welfare and Labor has aimed to reduce the total number of working hours accrued by workers [2], Japanese employees still worked an average of 1,889 hours annually in 1996, far more than most other industrialized countries [3]. This average does not include unpaid overtime that Japanese workers frequently accrue, especially in times of economic recession.

In 2001, the Japanese government commissioned for an educational campaign and research designed to reduce work stress. The government spent 349 million yen (US $2.9 million) to educate corporate personnel managers on how to recognize the signs of overwork [4]. Moreover, in response to increasing social concerns over this avoidable source of mortality and morbidity, the Japanese Ministry of Health, Welfare, and Labor also released new Workmen's Accident Compensation criteria for cardiovascular disease due to overwork [5]. In 2001, the Japanese Ministry of Health, Welfare, and Labor compensated 143 cases among 690 requests [2]. This number increased 68% from 2000 to 2001 and was the highest number recorded since the Japanese government began announcing the number of victims from overwork in 1987. To date, the incidence of cardiovascular disease due to overwork is severely under-reported but rising [6].

The increased risk of cardiovascular disease related to excessive work and occupational stress remains a concern in Japan. It is estimated that one third of deaths due to cardiovascular disease in those patients aged 20 to 59 years are related to some manner of excessive work [7]. According to a survey of 500 male white-collar workers who worked for top-ranking corporations in Tokyo, approximately 5-20 % of the workers identified themselves as being at high risk for *Karoshi* [8]. Excessive work and job stress must be prevented in Japan as a primary means of reducing the incidence of coronary heart disease.

A number of researchers have investigated the types of job stress that are associated with an increased risk of AMI. Of these job factors, job strain (defined as high job demand and low control) has been widely studied in European countries and in the United States [9]. In addition, low support at work in relation to an increased incidence of AMI also has been reported [10]. Two recent Japanese case-control studies reported a significant association between the incidence of AMI and excessive working hours combined with sleep deprivation [11, 12].

In several US and European studies, when patients were asked to list the causes of their AMI, they identified stress most frequently [13-15]. In one study [14], patients cited their job as the largest source of stress in their lives. To our knowledge, no investigators have examined whether factors such as prolonged working hours, sleep deprivation, high job strain, or poor support at work are related to patients' beliefs that job stress caused their AMI. Health care providers must examine the role of job stress in patient's lives and the extent to which patients perceive their stress at work as being a contributor to their overall cardiac risk.

The purpose of the study was to 1) explore whether job stress levels in Japanese patients with AMI differ from healthy Japanese participants, and 2) examine the types of stresses and cardiac risk factors associated with patients' belief that stress was the cause of their AMI. In this paper, AMI patients who believed stress was the cause of their AMI were termed "AMI job stress believers" and AMI patients who did not consider their job to be a factor in determining their cardiac disease were termed "AMI job stress non-believers." Figure 1 shows the design for this study.

2. METHODS

2.1. Participants

In total, 47 patients with AMI and 47 healthy participants were recruited. These patients with AMI also participated in a larger study (n=155) conducted to identify factors that contributed to time from symptom onset to treatment for AMI [16]. Data were collected in 2002 at three hospitals located in Aichi and at two hospitals located in Tokyo. Inclusion criteria for AMI patients were 1) AMI diagnosis, 2) mentally alert, 3) hemodynamically stable, 4) free from malignancy, and 5) employed full-time. The diagnosis of AMI was based on elevated cardiac enzyme levels (e.g. CK-MB, troponin), and at least one of these other criteria: 1) a history of ischemic symptoms, 2) development of pathologic Q waves on the electrocardiogram (ECG), 3) ECG changes indicative of ischemia (ST segment elevation or depression), and/or 4) coronary artery intervention [17].

For comparison, 47 healthy participants undergoing their annual physical examination (age within 5 years of the AMI group and gender matched) were recruited at one hospital in Aichi prefecture and one hospital in Tokyo as a comparison group. These healthy participants had no recorded history of CHD or malignancy, and were employed full-time. In Japan, under the law, workers need to complete an annual physical examination that includes blood and urine tests, chest X-ray, electrocardiogram, blood pressure, and height and weight measurements [18].

2.2. Procedures

The Institutional Review Board at all 5 clinical sites approved the study before researchers made contact with any patients. For AMI patients, permission for the interview was obtained from the patient's physician and nurse as soon as possible after the patient became hemodynamically stable. The researchers described the study to each potential participant and obtained a written informed consent from each patient who agreed to take part. The interview containing questions about job stress and causal belief was conducted at the patient's bedside within 7 days of hospital admission. On average, the interview was conducted approximately 4 days after hospital admission. The questions about the causal understanding of their AMI was always asked prior to the job stress questions.

Healthy participants were recruited to this study while they were waiting to discuss the results of their annual physical exam with their physician. After obtaining informed consent, the interview using the questionnaire was conducted in a private meeting room. Medical charts were reviewed to ascertain the presence and absence of cardiac risk factors.

2.3. Measures

2.3.1 Sociodemographic factors and cardiac risk factors

Medical chart review and patient interviews were used to collect sociodemographic and cardiac risk factors. Sociodemographic factors included age, gender, education, marital status, type of occupation, and presence/absence of night shift work. Smoking status was defined as either current smoker or non-smoker (including former smoker). Individuals were categorized as either overweight/obese (Body Mass Index (BMI)) greater than or equal to 25 kg/m^2) or not overweight/obese (BMI < 25 kg/m^2) [19]. Physical inactivity was defined as less than 30 minutes of exercise twice a week.

2.3.2. Patients' causal belief of AMI

To assess patients' causal belief of AMI, a semi-structured interview was conducted using the open-ended question, "What do you think caused your heart attack?," and "Please list three possible causes of your heart attack from most to least likely." If patients listed one of their answers as either "job stress" or "overwork," then job stress was recorded as a cause of their AMI.

2.3.3. Job factors

Job stress was assessed by the Brief Job Questionnaire, which consists of 4 subscales (job demand, job control, support from supervisors, and support from coworkers) [16]. Each subscale consists of 3 items which are answered on a 1 to 4 scale. The possible score for each subscale ranges from 3 to 12 points, with higher scores reflecting greater job demand, control, and support. The median score was used to divide into low and high scoring groups. Furthermore, high job strain (the combination of high job demand and low job control) was calculated, since it has been demonstrated that job strain is more associated with the incidence of AMI than either high job demand or low job demand alone [20]. The Brief Job Stress Questionnaire has adequate reliability with a Cronbach's alpha of 0.65 to 0.81 in a Japanese sample [21]. Acute job stress during the month prior to hospital admission was assessed by the question "During the month prior to your hospital admission, were there any incidents at work in which you felt emotionally intense or anxious?" If the answer was yes, the patient was asked to describe the incident. In addition, subjects were also asked about their number of working hours per week and average number of hours of sleep per night one month prior to their AMI or their annual physical check-up. The number of working hours/week was defined as duration between time of arrival and departure from their workplace over the week. If participants needed to work at home, we also counted these hours at home as working hours. However, working hours did not include commuting time or time for entertaining people outside of the company.

2.4 Statistical analysis

SPSS version 11 was used for data management and analysis. Independent t-test was used to compare working hours per week and sleeping hours per day, and Fisher's exact test or the Chi-square test was used to examine the proportion of cardiac risk factors to job stresses between AMI patients and healthy participants, and between AMI job stress believers and AMI job stress non-believers. Furthermore, multivariate logistic regression was used to identify whether each job stress factor predicted AMI after adjusting for known cardiac risk factors that were significantly different between AMI patients and healthy participants. The level of 0.05 was used to determine significance.

3. RESULTS

3.1.1 Sociodemographic characteristics and cardiac risk factors

Table 1 compares the sociodemographic variables and coronary risk factors between patients with AMI and healthy participants. There were no differences between the two groups in sociodemographic variables such as average age, marital status, education, and number of family members living with the participant. The average age of the patients with AMI was 52 years while healthy participants had an average age of 50 years. The majority of participants were married and approximately 70% of them lived with more than three family members. The type of occupation and percentage of workers working night shift did not differ between the two groups.

The presence of cardiac risk factors such as current smoking, hypertension, diabetes mellitus, hyperlipidemia, family history of coronary heart disease, sedentary lifestyle, and overweight (BMI $\geq$ 25 kg/m^2) are also shown in Table 1. Patients with AMI were more likely to smoke, to have high lipids, to have a family history of coronary heart disease, and to be overweight ($p < .05$). Both groups were sedentary.

3.1.2 Job stress factors

The percentage of job stress variables in patients with AMI and healthy participants is presented in Table 2. Average working hours a week were 58.3 (SD $\pm$ 15.0) hours in patients with AMI and 50.7 hours (SD $\pm$ 8.4 hours) in healthy participants ($p = .003$). In particular, approximately 30 % of patients with AMI worked more than 65 hours a week, as compared to only 2.1% of healthy participants ($p < .001$). No differences were found in average sleeping hours between two groups ($p > .05$).

Approximately 45% of patients with AMI and 25 % of healthy participants reported that they experienced acute stress in the workplace during the month prior to their hospital admission/visit ($p = .08$). These reported acute stresses were categorized into four types: 1) personal affairs (transferred to another department, notification of layoff, changing job, company merger, etc); 2) interpersonal problems (e.g. trouble with customers, trouble with coworkers, etc); 3) trouble with work quotas (e.g. not able to archieve a work goal, excessive quota, etc); and 4) company finances (e.g. difficulty in sustaining a company with deficits). The most frequently reported acute stress events were personal affairs in both groups. Stress from company finances was reported only by patients with AMI. From the Brief Job Stress Questionnaire, there were no significant differences in job demand, job control, and support from supervisors and coworkers. Furthermore the percentage of participants who were categorized as having high job strain (high demand and low control) was similar between the two groups (Table 2).

3.1.3. Causal beliefs of AMI patients

In this study, job stress/overwork was the second most frequently reported possible cause of AMI following smoking. Diet was the third most frequently reported possible cause. Although patients could list three possible causes of their AMI, 55% of them did not report three. Among the 47 patients with AMI, 38% (n = 18) reported that stress/overwork caused their AMI.

Table 3 shows the comparison of job stress factors between AMI job stress believers and AMI job stress non-believers. AMI job stress believers more often reported acute job stress events during the month prior to AMI, when compared to AMI job stress non-believers ($p = .006$). However, other factors such as work hours per week and amount of sleep per day were not associated with attributing their AMI to stress. Furthermore, there were no differences in job strain or amount of support received from supervisors and coworkers between AMI job stress believers and AMI job stress non-believers. In sum, patients who reported acute stress events during the month prior to their AMI were more likely to believe that job stress was the cause of their AMI than patients who had not experienced acute stress events.

3.1.4. Limitations

AMI patients and healthy participants were recruited in the same geographic areas with age and gender matched between the two groups. However, the generalizability of this study finding was limited by the fact we interviewed only patients who survived from AMI and met all inclusion criteria. Patients who died before reaching a hospital might have different work patterns or job stress levels. Another limitation of this study was that patients were asked to only list three possible cause of their AMI from most to least likely. For future research, patients should be encouraged to list all possible causes from most to least likely. Finally, the number of participants in the two groups was relatively small, which may have led to undetected differences between groups.

4. Discussion

Job stress factors were compared between AMI patients and healthy participants. In patients with AMI, the average number of working hours per week was significantly greater than in age- and gender-matched healthy participants. The association between prolonged work hours before AMI and an increased risk of AMI has been reported by other investigators [11, 22]. For example, a recently published study reported that Japanese men who worked more than 60 hours per week had a twofold increased risk of AMI, compared to those who worked less than or equal to 40 hours per week [11]. Sokejima and Kagamimori conducted a case-control study with Japanese working men and showed a U-shaped distribution between working hours and the incidence of AMI [22]. Working $\geq$ 11 hours per day or $\leq$ 7 hours per day was associated with a significantly increased risk of AMI, compared with working > 7 hours to < 9 hours per day in the month prior to hospital admission, after adjusting for age, occupation, and cardiac risk factors. However, since there were few people who worked less than 40 hours per week in our sample, we did not see this U-shape distribution. Tension from prolonged working hours increases sympathetic nervous system activity, and it can raise serum norepinephrine levels, blood pressure and heart rate [23, 24]. These physiological changes may in turn trigger acute coronary events. In addition, prolonged working hours were associated with increased risk of other cardiac risk factors such as such as non-insulin dependent diabetes mellitus [25] and being overweight [26, 27].

Comparing AMI patients to healthy participants, no differences in job demand, job control, job strain, or support from supervisors were found. Other investigators have demonstrated that high job strain appears to increase cardiac risk factors [20, 28, 29]. However, negative findings have also been reported [30-32]. Furthermore, a combination of high job strain and low social support at work increases cardiac risk factors, compared to the combination of low job strain and high social support at work [33]. One study reported that low social support at work alone was associated with an increased incidence of AMI [20]. In our study, AMI patients reported lower social support from coworkers than healthy participants, but the differences did not reach statistical significance. This lack of a significant difference might be a result of not having enough subjects to detect differences between AMI patients and healthy participants.

While AMI patients worked significantly longer hours than healthy participants, job demand did not differ between the two groups. This finding is counterintuitive but may reflect the drive of AMI patients to excel in work and their acceptance of long hours as means of excelling. Patients with an AMI may see long hours as a reasonable cost to achieving success, and not equate a high number of working hours to increased job demand.

According to new criteria for Workmen's Accident Compensation for cardiovascular disease due to overwork by the Japanese Ministry of Health, Welfare, and Labor [5], working hours and conditions during the 6 months prior to death will be taken into consideration, rather than just one week prior to a patient's death. Current criteria require that patients work more than 100 hours overtime the month before death or an average of 80 hours overtime 2 to 6 months before death to implicate overwork as a cause of AMI [5]. In this study, AMI patients averaged 18 hours per week of overtime, and their monthly overtime ranged from 72-80 hours. Moreover, 30 % of AMI patients worked more than 65 hours a week in the month prior to their AMI. Excessive work in people who experience an AMI must be assessed along with other known cardiac risk factors.

Our results indicate that patients who work long hours are unlikely to identify excessive work hours as a cause of their AMI, while a stressful event at work leads patients to identify job stress as a possible cause of AMI. This discrepancy may be related to the nature of working conditions in Japan. Working long hours can be chronic and become a routine part of life. Moreover, the norm of a company can influence a patient's perception. Japanese companies emphasize collaborative teamwork. If the majority of workers in the department or company work long hours, a patient may not perceive that the prolonged working hours are a risk factor for AMI. On the other hand, acute stressful events such as transfer to another department, notification of a layoff, company merger, or trouble with a supervisor/a customer may be experienced as more stressful when compared to everyday work. Thus, patients with stressful events in the work place were more likely to believe that job stress caused their AMI.

Clinical Implications

Approximately three out of four patients eventually go back to work following AMI and these patients are at high risk for a second AMI [34, 35]. Health care providers need to assess whether patients have worked excessive hours prior to their AMI, and the degree to which patients perceive that long hours at work contribute to their AMI. If patients do not acknowledge excessive work and job stress, they are likely to return to the same pattern of excessive work that contributed to their cardiac risk. Many Japanese male workers remain at the same company until retirement [33, 36]. As with other cardiac risk factors such as obesity, physical inactivity, and hypertension, job stress management in post AMI patients is an important consideration in secondary prevention in Japan.

Despite education and counseling for job stress management, sometimes it is not easy for an individual to modify his/her work style within a specific corporation. Work values, such as the importance of hard work, loyalty to one's company, and intolerance for absenteeism are deeply rooted in the Japanese sociocultural system [32]. Without changes in health care policy, social norms, and corporate expectations for workers, the adoption of reasonable work hours for purposes of health may not occur.

6. Acknowledgement

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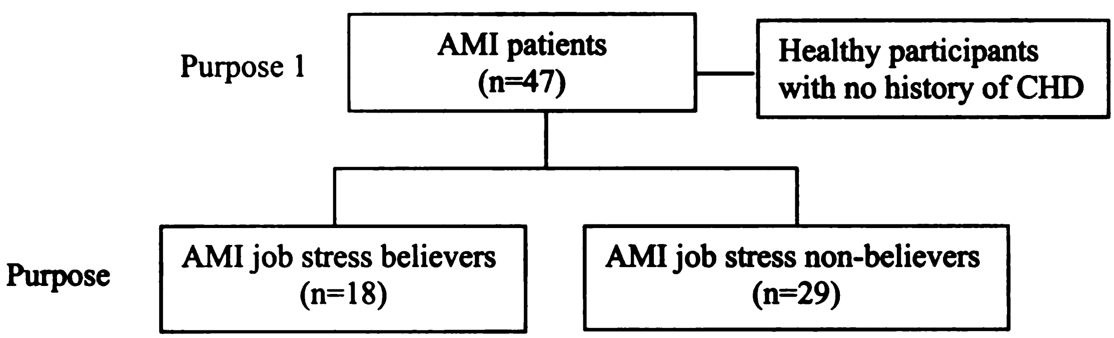
Figure 1. Study design



CHD = Coronary Heart Disease

Table1 Sociodemographic variables and coronary risk factors in AMI patients and healthy participants: percentage (number) or mean (SD) value

Variables	AMI patients (n=47)	Healthy participants (n=47)	P value
Average age year (SD)	52.0 (6.1)	50.7 (6.1)	.30
	% (n)	% (n)	
Male gender	98.0 (46)	98 (46)	1.00
≥ College education	48.9 (23)	42.6% (20)	.54
Marital status (Married)	80.9 (38)	93.6 (44)	.12
≥ 3 family members in home	70.2 (33)	74.5 (35)	.82
Occupation (White collar)	78.7 (37)	87.2 (41)	.41
Working at night	12.8 (6)	8.5 (4)	.74
Smoking	70.2 (33)	42.6 (20)	.01
Hypertension	42.2 (19)	25.5 (12)	.12
Diabetes mellitus	29.8 (14)	12.8 (6)	.08
Hyperlipidemia	60.0 (27)	27.7 (13)	< .01
Family history of CHD	36.2 (17)	12.8 (6)	.02
Physically inactive (< 2 times exercise /week)	89.4 (42)	95.1 (40)	.76
BMI≥25 kg/m^2	55.8 (24)	29.8 (14)	.02

BMI: Body Mass Index kg/m^2; CHD: Coronary Heart Disease

Table 2 Comparison of Job stress factors in AMI patients and healthy participants

	AMI patients (n=47)	Healthy participants (n=47)	p value
Average working hours / week (SD)	58.3 (15.0)	50.7 (8.6)	<.01
Average sleeping hours/day (SD)	6.3 (0.9)	6.6 (0.9)	.15
	% (n)	% (n)	
Acute stressful events during the month (yes)	44.7 (21)	25.5 (12)	.08
Brief Job Stress Questionnaire			
1) Job demand			
high	48.9 (23)	68.1 (32)	
low	51.1 (24)	31.9 (15)	.09
2) Job control			
high	55.3 (26)	59.6 (28)	
low	44.7 (21)	40.4 (19)	.84
3) Support from supervisors †			
high	57.5 (23)	51.2% (21)	
low	42.5 (17)	48.8% (20)	.66
4) Support from coworkers ‡			
high	51.1 (24)	71.7 (33)	
low	48.9 (23)	28.3 (13)	.06
Job strain#	26.6 (12)	27.7 (13)	1.00

† 7 AMI patients and 6 healthy participants did not have supervisors.

‡ 1 healthy participant did not have coworkers.

high demand and low job control

Table 3 Comparison of job stress variables in AMI job stress believers (n=18) and AMI job stress non-believer (n=29)

Variables	AMI job stress believers (n=18)	AMI job stress non-believers (n=29)	p value
Average working hours / week (SD)	57.9 (14.0)	58.6 (15.8)	.89
Average sleeping hours /day (SD)	6.5 (.72)	6.2 (.94)	.31
	% (n)	% (n)	
Acute stressful events during the month (yes)	72.2 (13)	27.6 (8)	< .01
Brief Job Stress Questionnaire			
1) Job demand			
high	50.0 (9)	48.3 (14)	
low	50.0 (9)	51.7 (15)	1.00
2) Job control			
high	66.7 (12)	48.3 % (14)	
low	33.3 (6)	51.7 % (15)	.25
3) Support from supervisors †			
high	53.3 (8)	60.0 (15)	
low	46.7 (7)	40.0 (10)	.75
4) Support from coworkers			
high	38.8 (7)	58.6 (17)	
low	61.1 (11)	41.4 (12)	.24
Job strain‡	16.7 (3)	31.0 (9)	.32

† Of AMI patients, 3 job stress attributers and 4 job stress non-attributers did not have supervisors.
‡ high demand and low job control

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CHAPTER SIX

Conclusion and recommendations for future research

The main aim of this dissertation was to examine the relationship between care seeking processes and the Japanese culture/health care system in patients with an evolving AMI. These findings were presented in chapter 2 and 3. A secondary aim of this dissertation was to explore the illness attributions in patients who experienced AMI. These findings were presented in chapter 4 and 5.

Care Seeking Processes in Relation to Health Care System and Japanese Culture

The Japanese medical care system includes a large network of neighborhood clinics and small hospitals (Level I hospitals) that provides urgent care to patients with non-life threatening problems at a low cost. In addition, a patient does not have to make an appointment to see a physician in these clinics or small hospitals. In this study, 54% of patients with an evolving AMI first sought care at one of these institutions, although they do not provide continuous cardiac monitoring or revascularization. These patients had approximately three times longer prehospital delay times than those who directly went to hospitals that could provide cardiac intervention (Level II hospitals). Patients who had less severe chest pain and who did not recognize symptoms as cardiac in origin were significantly more likely to visit a Level I hospital compared to those who had severe chest pain and who ascribed their symptoms to a cardiac cause after controlling for age, gender, and income.

Within this single Japanese sample of patients with an AMI, a wide variation in the independent and interdependent construal of self was found. Patients with an independent construal of self were significantly more likely to seek treatment at a Level II hospital, controlling for age, gender, symptom severity, diaphoresis, and time of day and week that symptoms started. Moreover, an interdependent construal of self was positively associated with prehospital delay time. These findings have to be replicated in the future, since this was the first study to examine the relationship between care-seeking processes and independent and interdependent construal of self in patients with an evolving AMI. The findings of the present study point to the importance of defining the dimension of culture. Beyond ethnicity and nationality so that researchers can compare outcomes within a culture as well as across cultures. For example, we described a part of care-seeking processes prior to hospital admission, but patterns of interaction among ingroup members and patterns of seeking help from ingroup to outgroup members need to be further examined in Japan. Researchers must understand these patterns to develop effective intervention strategies in order to prevent delay in accessing care.

Illness Attribution

In Japan, the prevalence of cardiac risk factors has dramatically increased due to life style changes. However, the results of the present study suggest that the majority of Japanese patients do not perceive their cardiac risk factors as a cause of their AMI. Smoking was the most frequently identified primary cause of AMI reported by Japanese patients, followed by stress and diet respectively. In addition, patients with a history of CHD were less likely to attribute their cardiac risk factors as a cause, compared to those without a history of CHD. This counterintuitive finding might indicate that patient education following AMI was not as effective as health care providers assume.

In our subgroup analyses, patients with AMI worked significantly longer hours than age, gender, and geographically matched health participants (58.3 $\pm$ SD 15.0 hours vs. 50.7 $\pm$ SD 8.6 hours, respectively). While long working hours were not associated with a belief on the part of the patient that job stress caused their AMI, experiencing an acute job stress event during the month prior to their AMI led patients to believe that job stress was a cause. Management of job stress in patients after AMI is an important approach to secondary prevention, as with other cardiac risk factors such as obesity, physical inactivity, smoking, and hypertension. Health care providers need to assess a patient's view of illness prior to providing any education and counseling about cardiac risk reduction. Furthermore, a longitudinal study needs to be conducted to identify the association between behavior change after AMI and causal attribution.

Conclusion

In the future, the incidence of ischemic heart disease may increase in Japan due to an increased prevalence of cardiac risk factors. The influence of cultural practices or beliefs may not be apparent in responding to life-threatening illness. Yet, it is important to continue to examine care seeking processes and causal attributions related to AMI within the context of Japanese culture and the Japanese health care system. Both areas of knowledge are necessary for health care providers to appropriately counsel individuals who are at high risk for AMI, or who have already experienced an AMI. To improve prehospital delay time and public awareness of cardiac risk factors, these important health issues also need to be incorporated into health care policy in Japan.