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Contemporary Physician Practice Patterns: Insights from Institutional Theory

By

Laurel Kim Taylor 

A thesis submitted to the Faculty of Graduate Studies and Research in partial fulfillment of the requirements for the degree of Doctor of Philosophy

in

Organizational Analysis

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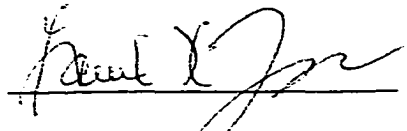

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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled *Contemporary Physician Practice Patterns: Insights from Institutional Theory* submitted by *Laurel Kim Taylor* in partial fulfillment of the requirements for the degree of *Doctor of Philosophy* in *Organizational Analysis*.

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Harvey Krahn

Date: April 12, 2001

Dedication

This research is dedicated to following individuals without whom this work would not have been completed. To Terry Montague for his uncommon vision and commitment, Dr. Koon K. Teo for his continued research and support, Shirley Taylor for her unwavering confidence and love, and Bob Hinings for his extraordinary patience and encouragement.

Physician Practice Patterns: Insights from Institutional Theory
By Laurel Kim Taylor

Abstract

Practice homogeneity in the institutional field of medicine has been consistently observed in numerous clinical specialties. Of specific interest is the less aggressive diagnosis and treatment of older and female patients, irrespective of disease state. In the last decade, this has been established for the management of heart attack, or acute myocardial infarction (AMI), the single largest cause of death in Canada. Among the university and community hospitals audited, the use of proven efficacious drugs increased over time, partly due to feedback of practice patterns to prescribing physicians and the use of explicit guidelines. Proven drug use was, however, consistently lower across time and geography for females and patients over 70. This is despite the biologic reality that efficacious drugs have greater efficacy in older and female patients because of their higher risk. In Phase I of this study, a five-province, three-specialty survey questionnaire of intended AMI practices, confirmed age-based, but not sex-based, differences.

Institutional theory applied to the medical arena provides insights into that environment and its organizational practices in ways that have a practical and long term impact on patient outcomes. The remarkable similarity in practice patterns across geographic and specialist boundaries is explained utilizing institutional theory, specifically the propensity of organizations to resemble one another through the process of institutional isomorphism, which constrains organizations to adopt

similar structures and practices. Isomorphism of physician diagnostic and treatment patterns forms the primary focus of this research, particularly in Phase II where 54 physician interviews demonstrated that age and sex-based differences in physician treatment patterns are a result of coercive, mimetic and normative isomorphic mechanisms. However, the strength of these mechanisms appears to vary. Coercive mechanisms present the lowest level of influence in generating and maintaining patterns of practice in the form of practice guidelines and opinion leaders. Mimetic mechanisms are greater in number and influence and include modeling, mentoring, opinion leaders and knowledge diffusion. However, normative mechanisms are greatest in number and scope. Conceptions of professional work, autonomy, attitudes, values and beliefs as well as structural conditions, all affect what practices are generated and maintained.

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Chapter 1: Introduction

Research in organizational theory attempts to explain why organizations are so often similar to one another rather than exhibiting tremendous variety. Institutional theory explains such homogeneity of organizations, which may be defined as being within an organizational field.

Institutional theory is an integral component of the larger body of organizational theory. It has been utilized to examine and explain numerous types of phenomena within organizations and their environment, including organizational processes, organizational change, organizational structure and strategy. Within these examples of the theoretical development of institutional theory there is, however, a relative lack of empirical research on how institutional practices are generated and persist (DiMaggio, 1988; Abernathy and Fong, 1996; Barley and Tolbert, 1997). And, the literature continues to debate the theoretical underpinnings of the theory itself (Scott, 1987; Scott, 1995; Selznick, 1996). Nonetheless, institutional theory remains a very attractive basis to frame the description, investigation and societal implications of the remarkable homogeneity, based on age and sex of the patient, of modern medical treatment.

Physician practice pattern homogeneity in the organizational field of medicine has been consistently observed in numerous medical specialties (Pearson et al, 1992). Specifically, there is less aggressive investigation and treatment of older

and female patients relative to their younger and male counterparts, irrespective of disease state. This has recently been established in the treatment of heart attack, or acute myocardial infarction (AMI), victims in a series of studies from several Canadian university and community health centres. Data revealed the utilization of proven, efficacious drug therapy continually increased in the overall heart attack patient population from 1987 to 1993, partly due to regular dissemination of practice pattern information to prescribing physicians and the use of explicit guidelines (Montague et al, 1995). Inexplicably, however, the use of some proven drugs was consistently lower for female AMI patients and for those over 70 years of age. This is despite the biologically reasonable expectation that efficacious drugs should display their greatest efficacy in older and female patients because these patients have higher risk and, therefore, greater opportunity for the efficacious drugs to work.

One of the most interesting features of this phenomenon is the homogeneity of practice patterns across the geographic areas represented by the aforementioned AMI studies. One might expect, simply by chance, that one of the nine component institutions would exhibit practice patterns that did not follow the other centres. It is also quite remarkable that the utilization of the proven efficacious drugs increased for this population, which was the intended outcome, but the gains were continually greater for the younger and male patient groups in the population. That is, the utilization for older and female patients continually lagged behind. This is interesting because the general intent of studying

practice patterns and utilizing specific practice guidelines is to bring about more consistent treatment, and improved outcomes, for a patient population as a whole, not subsets thereof. The target of improvement includes such patient outcomes as mortality and morbidity, but also measures such as repeat hospitalizations and quality of life. That such activities would, indeed, create the intended outcomes, but, consistently more so for the portion with the lowest risk within the whole population at risk, is extraordinary.

This remarkable similarity in organizational practices within medicine may be explained utilizing institutional theory. The theory views the organization, and thus the organizational actors, as part of an open system, strongly influenced by the environment. The environmental influence produces organizational practices which are the result not solely of rational pressures for more effective performance, but of social and cultural pressures to conform to conventional beliefs (Meyer and Rowan, 1977). This theory explains the propensity of organizations in a particular sector to resemble one another, through a process of institutional isomorphism (DiMaggio and Powell, 1983).

Isomorphism is a constraining process by which organizations in a sector adopt similar structures and practices. Isomorphism of physician practice and the resulting treatment patterns form the focus of this research. The use of institutional theory to study this medical arena and issue will provide insights into

how the environment influences organizational practices in ways that have a practical impact on the outcomes of organizational practices.

In particular, this study will provide insights into the presently poorly understood, and complex, decision-making behaviour that determines the clinical management of patients with heart attack, or AMI, the single largest cause of death in Canada.

The main objectives of the study are to investigate the fundamental questions:

- In a large, prospective survey of Canadian physicians, are age and sex[1] treatment differences evident in the treatment of patients with AMI?
- What mechanisms are responsible for this treatment bias and how do these mechanisms manifest themselves in AMI practice patterns throughout the organizational environment to allow the homogeneity of treatment to continue?

The study will interrogate, in a rigorous and clinically realistic fashion, physicians in a wide variety of Canadian health care centres and practice settings. Although current data from a few centres suggest the existence of age and sex bias, this study will examine the presence of similar biases in a numerically large, and geographically and clinically broad, sample of physicians across the nation.

It is expected that the existence of treatment and prescribing bias will be confirmed through the measurement of intended practice pattern surveys. More importantly, an increased understanding will be gained of the mechanisms that exist in the organizational environment to allow such a bias to exist and propagate. It is also anticipated the insights, when fed back to the organizational players, would drive an improvement in actual practice patterns and produce a long term positive impact on the effectiveness of practices. The intention then, is not merely to document the existence of these possible therapeutic biases, but to determine the mechanisms that allow these biases to be established and maintained. The ultimate benefit will be improved patient outcomes for the number one cause of death in Canada. It is further anticipated the results and implications of this study will also be applicable to the diagnostic and therapeutic processes in other burdensome disease states.

This research will make a contribution in two major arenas, the first in organizational theory and the second in the medical literature. Generally, the results and methodology will contribute to the empirical research in institutional theory. The management literature is rife with articles of a theoretical nature, for example combining institutional theory with other prevalent organization theories (see for example Roberts and Greenwood, 1997 and Oliver, 1997). However, empirical research examining evidence or defining such elements utilizing all isomorphic mechanisms is relatively uncommon (Mizrichi and Fein, 1999). The proposed research will add to the vital core of empirical work and,

simultaneously, add weight to the thecretical base that suggests that institutional processes are crucial in explaining organizational behaviour. More specifically, the results from this work will contribute to the identification of mechanisms of isomorphism, particularly in the health care field. A review of the literature suggests that empirical work in this area is distinctly lacking. A recent study by Mizruchi and Fein (1999) points out that even though there have been a substantial number of citations, from 1984 through to 1995, of DiMaggio and Powell's (1983) article, only 26 of 160 articles (from six major North American management journals) investigated included an attempt to operationalize and empirically test one or more isomorphic mechanisms. Additionally, Mizruchi and Fein illustrate that the majority of these studies utilize mimetic isomorphism, with only two studies utilizing all three isomorphic mechanisms. It is also interesting to note that the majority of these studies utilize quantitative organizational parameters to assess the presence and significance of isomorphic mechanisms. Qualitative studies have been published to a much lesser extent.

An important tenet of this theory is that institutional isomorphic processes occur even when they do not contribute to organizational efficiency (DiMaggio and Powell, 1983). It is vital to recognize this in the medical arena since a common assumption is that all, or almost all, clinical activity and decision-making benefits the patient. However, in this case, it may be that untreated, or less than optimally treated, patients will result in increased physician visits, unnecessary

hospital admissions, declining health status and quality of life and, potentially, premature death.

A supplementary implication of this work is the contribution it will make in terms of combining social science theory and real-life medical experiences to answer practical questions in a joint effort of investigators. While perhaps of secondary importance in the organizational and medical literature, it may be that such joint efforts and expertise will produce a synergy of knowledge otherwise unattainable.

Finally, it probably bears repeating that the results of this work will have public health relevance, not only for improving the management and outcomes of heart attack patients, but also for other important diseases. As reported by Selznick (1996) "In a little known chapter of Logic: The Theory of Inquiry, John Dewey (1938) argued that social science should be guided by problems of life and practice rather than by intellectually self-generated conceptions and techniques" (270). This research can be considered to follow Dewey's theory of inquiry. A recent study by Lichtenberg (2000) suggests that each new drug approved in the United States between 1970 and 1991 saved 11,200 life-years in 1991. This estimate reflects the mortality reduction benefits of each of these drugs, and does not even take into account morbidity reduction or quality of life improvements that also result from the introduction of new drug therapies. However valuable drug therapy may be, it is worth considerably less if

organizational influences prohibit its application in any specific patient population or sub-population. Thus, if female and elderly patients are relatively denied the opportunity to benefit from such mortality reductions (as well as improved quality of life), research that identifies the mechanisms that maintain this type of activity is imperative.

This thesis is organized to guide the reader through the research in the order in which the project was brought to life and the "lens" through which it will be viewed. The next chapter expands the concept of physician practice patterns and reviews the available medical literature illustrating the age and sex differences in practice patterns for related and unrelated diseases. The main purpose of the review is to provide an understanding of physician practice patterns, to illuminate current activity in this area, and also to illustrate the breadth and depth of the problem. The third chapter provides an overview of the theoretical basis for investigating the issue, namely institutional theory. A literature review is provided, with details regarding what specific issues will be addressed by utilizing institutional theory and how the present research adds to the existing institutional theory literature. The fourth chapter describes the methodological framework for the project, with chapter five summarizing the results of the two phases. Finally, chapter six includes a discussion of this research, summarizing the implications of the findings as well as examining the weaknesses of the study and important future research priorities.

Chapter 2: Physician Practice Patterns

Physician behaviour has recently been subjected to increasing scrutiny in terms of appropriateness of care and health outcomes, particularly as these relate to health care expenditures (Wennberg, 1998). Examination of physician practice patterns is one avenue that organizations are utilizing to determine how health care is being delivered and what changes are necessary to deliver this care effectively and efficiently, usually on a best cost basis.

Physician practice patterns examine behavior in terms of exactly how a physician, or group of physicians, deliver care to a recognizable population of patients, for example, the pattern of decisions regarding the typical investigation and treatment for the management of patients with heart attacks. Practice patterns may look at the utilization of specific drugs in controlling a chronic disease, such as cancer or heart disease, or the utilization of diagnostic and investigative tests for a particular patient population. Practice pattern evaluation often results in efforts to change the behaviours of individual physicians whose practice patterns differ significantly from the norm (Harris, 1990), or practice pattern analysis is initiated to develop and implement clinical practice guidelines, and to monitor their impact, particularly when it becomes apparent that current practice and outcomes could be improved (Lewis, 1995).

Past research regarding physician practice patterns has largely focused on the processes of diagnosis, particularly the cognitive judgement and decision making that occur as physicians make, or come to a decision, regarding a major diagnosis. Less work has been done to investigate the mechanisms which influence the treatment, or prescribing, behaviour of physicians subsequent to the diagnostic process (Raisch, 1990). Moreover, the previous studies of prescribing behaviour have tended to focus on the physician's decision to choose a particular brand of drug from a drug class, rather than the decision to prescribe or not prescribe the drug class itself.

Recently, in the medical literature, attention has been paid to the differences in utilization levels of particular drugs and diagnostic tests (see for example Gurwitz et al, 1991; Jaglal et al, 1994; Lubben et al, 1989; and Wennberg, 1998). These studies have revealed a high level of apparently random variation in such physician decisions, including on physician-individual and geographic levels. This variation, in many disease states, has become the focus of much of the current research regarding physician behaviour.

The usual goal in contemporary practice pattern research has been changing physician behaviour to follow, or match, clinical care guidelines, or critical paths, usually developed locally or adopted from provincial or national guidelines proposed by expert panel consensus. However, a review of the literature attests to the fact that little attention has concentrated on how practices or treatments

are operationalized on a usual care basis by a physician, or group of physicians, for specific diagnoses, or how these practice patterns are transferred through an institution in order that they are maintained.

The Genesis of Practice Pattern Variation

Small area variation came to light almost three decades ago, presented in a classic article by Wennberg and Gittelsohn (1973), that suggested that not every physician practiced in the same way. Due to this revelation, there was a flurry of activity that illustrated that variation was, in fact, the norm, not the exception it was originally thought to be. Following this initial data gathering, there has been a burgeoning interest in the methods that allow administrators, physicians and other stakeholders to attempt to alter practice patterns. These methods include efforts such as guidelines, critical paths (Haines and Feder, 1992; Poses, 1999), and more recently, evidence-based medicine, in an attempt to reduce the variation in practice patterns for specific patient populations (Hux and Naylor, 1997).

Two notions regarding the current focus of practice patterns research are built on in this thesis. First is the concept that various methods have been utilized to attempt to change practice patterns to reflect local, provincial or national practice ideals, with varying success being reported in the medical literature (Oxman et al. 1995). This suggests that there is no one method recognized as being universally successful in altering physician behaviour in terms of treatment and

prescribing patterns. Second, and more importantly, is the fact that before attempting to alter practice patterns, virtually no research has focussed on understanding how practice patterns are initially formed and subsequently, how those patterns are maintained over time and space, or how they can and do change, without explicit interventions aimed at specific diagnoses. An understanding of practice patterns is therefore important in the context of this research. This includes the understanding of the generation and persistence of this phenomenon in general, and the generation and maintenance of acute myocardial infarction (AMI), or heart attack, practice patterns, in particular.

Wennberg and Gittelsohn (1973) introduced, in modern North American medical literature, the theory of small area variation. This classic article published the first evidence to suggest there was significant, and unexplained, variation in the practice patterns of physicians in small geographic areas. It was observed in the context of investigating the effect of legislation that extended planning and regulatory authority in the health care arena in the United States, and the necessity for resource use to aid decision making and planning. The authors examined utilization rates for various medical procedures in the state of Vermont. For example, data suggested that there was a wide variation in rates of tonsillectomy. "Assuming that age specific rates remain stable, there is a 19 percent probability that a child living in Vermont will have his tonsils removed by age 20. The probability recorded in the highest service area is over 66 percent, as contrasted with probabilities ranging from 16 percent to 22 percent in the five

neighboring communities, which are ostensibly similar in demographic characteristics" (1105). At the time of this article, the authors suggested that the evidence presented regarding variance posed questions rather than answers. Almost thirty years later, those same questions remain.

The Effectiveness of Practice Pattern Intervention

As research activity increased in this area, and evidence of practice pattern variation increased, interest focussed on providing interventions to change physician behaviour to mitigate the practice variations (Poses, 1999; Westert and Groenewegen, 1999). There was a remarkable variability in the success of such interventions (Oxman et al. 1995). For example, some critical paths or practice guidelines have been reported in the literature as having been extremely successful in terms of adoption. This success, however, was not a universal experience at all centres utilizing practice guidelines. As Grishaw and Russell (1993) noted, changing behaviour with practice guidelines requires much more than simply producing an acceptable guideline, but rather involves a wide range of complex issues, including "the clinical context and the methods of developing, disseminating, and implementing those guidelines. Different methods will be appropriate in different contexts" (1321). There are a number of issues identified in the medical literature outlining potential barriers to guideline adoption, including lack of computerization, attitudinal barriers and variable coverage of clinical issues in existing guidelines (Veale, Weller and Silagy, 1999). It is the notion of attitudinal barriers that are of interest in this research.

For the diagnosis of AMI, or heart attack, coverage of clinical issues has been broad and many fundamental questions have been answered that allow high degrees of certainty around the appropriate and efficacious treatment options.

Oxman et al. (1995) investigated the success of ten different types of interventions aimed at changing physician behaviour including: educational materials; conferences; outreach visits; local opinion leaders; patient-mediated interventions; audit and feedback; reminders; marketing; multifaceted interventions; and, local consensus processes. The results of this research suggest a wide range of success of these different types of interventions both in terms of physician performance and patient outcomes. Overall, the authors suggest that any single intervention has "modest or negligible practice effects when used alone" (1427). However, a combination of methods may have cumulative and significant effects. The authors again suggest the necessity of "designing and selecting appropriate interventions across a wide range of professional activities in which gaps between evidence and practice are found" (1427). The Oxman et al. (1995) article, however, falls short of probing for the underlying problems associated with prescribing and treatment patterns. Instead the authors suggest that effort needs to be put into standardizing reporting methods for intervention trials. This recommendation itself presents the aforementioned situation in which alternative interventions are being investigated without an appropriate understanding of the problem or problems for which the solutions are being designed.

Similarly, Goldberg et al. (1998) investigated the effectiveness of academic detailing and continuous quality improvement teams in increasing adherence to national guidelines for the treatment of hypertension and depression. This randomized, controlled trial established the ineffectiveness of either of these methods in increasing guideline compliance or improving patient outcomes. Similar research has shown that attempts to provide education to physicians to encourage guideline adoption have also met with varying success. According to Gifford et al (1999), a multifaceted education program can improve guideline adoption, however, agreement of care with the proposed guideline varied from 27% to 99%, again, suggesting that variation in treatment patterns exists even with interventions intended to reduce practice variation. Similarly, Hayward et al. (1997) studied guideline adoption in a Canadian setting and found that, although physicians have generally positive attitudes regarding guidelines and the utilization of guidelines, they have not been integrated to any great degree into the day-to-day practice.

Questioning the Purpose of Clinical Guidelines

Guideline adoption (or non-adoption), as the current medical literature suggests, is fundamentally an issue of physician behavior and physician decision making. As Poses (1999) notes, there have been many interventions undertaken in an effort to change physician behaviour, which appears to be resistant to change, but there is relatively little evidence regarding the effectiveness of these

interventions. Further, the author posits that there are several fundamental questions that need to be answered before any interventions to elicit behavior changes are undertaken.

The initial question is does the behaviour actually need to be changed? This question stems from the lack of connection between interventions designed to change behaviour and any outcome measures that suggest such behaviour changes result in improved patient outcomes. One recent study suggests that guidelines do not consistently result in improvements in clinical outcomes for patients (Worrall, Chaulk and Freake, 1997). It is unknown whether this may be a potential cause of the existence of variation or perhaps for the variation in guideline adoption rates. However, it is a signal that the interest and research in the area of medical guidelines is maturing toward understanding the implications of practice pattern variation on outcomes, and such information may provide clues regarding physician attitudes towards patterns of practice.

From this initial question Poses (1999) suggests two implicit questions follow. The first asks if there is a "logical, evidence-based argument that one decision alternative is preferable for a particular situation" (487) and the second questions the availability of evidence that physicians are indeed not choosing such a clearly preferable alternative when that is the apparent, logical choice. Also, applicable in this context is the notion that if the fundamental problem has to do with decision making on the part of the physicians, then it is necessary to

determine what the actual issues are in terms of decision making and decision-making processes. Based on the answers to these questions, only then does it make sense to begin to determine how decision making could be altered. As Poses (1999) suggests, "understanding why the behavior should be changed and what caused it may make the process of designing interventions more complicated. The resulting interventions, however, are more likely to be simple and successful" (493).

Physician Behaviour versus Physician Knowledge

In relation to the question regarding actual physician behavior in a specific situation, it is relevant to note that self-reported adherence to guidelines are subject to bias and are not likely a very trustworthy, single measure of guideline adherence (Adams et al, 1999). This study suggests that such self-reports regarding guideline compliance may illustrate that physicians have a high level of knowledge of treatment recommendations, but this knowledge is not being translated into actual practice or treatment decisions. For example, Kljakovic and McLeod (1997) found that self-reported asthma management data was not an accurate reflection of how these patients were actually treated when data was collected from patient charts. This is important in determining what type of practice pattern analysis is valuable for its ability to accurately portray what is occurring in the treatment of AMI, rather than what physicians' understand about appropriate treatment. Studies measuring changes in physicians' practice patterns due to various interventions which are based on self-reports may at

best provide an indication of how well physicians understand information regarding current changes in specific treatment options and at worst may be misleading in understanding the effectiveness of interventions intended to change behaviour (see, for example, Fidler et al., 1999 and Lomas et al., 1989). For example, O'Connell et al. (1999) found using different data collection techniques that physician feedback intended to change prescription rates had no impact on the prescribing levels of a group of general practitioners.

Another salient and related point in the area of guideline research is that guideline adoption or non-adoption does not necessarily equate to guideline knowledge. Meyers and Steinle (1997) suggested that an underutilization of guidelines for prevention practices was not likely due to a lack of knowledge of published guidelines. This suggests, again, that there may be reasons for physician behavior other than being unaware of the availability of new or specific treatments, or having no knowledge of current practice guidelines.

In the realm of medical research to define causal inference, randomized, double blind, clinical trials are at the pinnacle of research design (Montague et al, 1995). While not all medical questions can be answered via a clinical trial, many compelling issues of therapeutic efficacy have, in fact, been solved by long-term clinical trials. Relatively clear information exists to enable physicians to identify appropriate treatment patterns. Such evidence-based treatment guidelines provide physicians with the advantage of synthesizing a broad body of

knowledge and the dissemination of such knowledge can be made fairly readily available to most physicians. Other areas of clinical practice, particularly the usefulness of some diagnostic tests, are somewhat more controversial. The outcomes of clinical trials fall under the topic of evidence-based medicine, of which one goal is to translate trials research and subsequent findings into practice patterns for a wide range of physician groups. As Fitzgerald and Ferlie (1998) suggest, clinical practice and health care policy should, ideally, be based on data and a formal mode of rationality. However it is apparent that it is not adequate to simply disseminate this type of information and to expect relevant behavioral change to be enacted. (Hux and Naylor, 1997; Fitzgerald and Ferlie, 1998). As Hux and Naylor suggest (1997), "how are we to respond when evidence has been disseminated and received by practitioners without changing their practices – when, in effect, "knowing enough is not enough"?" (1160).

Current Proven, Efficacious Therapies in Acute Myocardial Infarction

To begin to appreciate practice patterns in AMI and how closely they reflect proven, efficacious therapies, a brief review of the literature is necessary to ascertain what evidence base exists and what that evidence base says regarding currently recognized efficacious treatments. In particular it is necessary at this point to review the available evidence that conclusively establishes which drug therapies are efficacious in the treatment of AMI and which therapies may not be efficacious or may be controversial with respect to their use. Large-scale, randomized clinical trials have, in the past decade,

established incontrovertibly, the efficacy of the use of thrombolytic therapy, aspirin, beta-blockers, and lipid lowering drugs in significantly reducing the risk of death for patients having AMI. They also reduce the risk of subsequent acute events, such as repeat heart attacks and re-hospitalization, among such high-risk cardiac patients. In summary, these drugs have been proven to be efficacious from both clinical and economic viewpoints. There are essentially no qualitative interactions in biology, or clinical medicine. That is, if a drug is effective in reducing risk in the treatment for AMI, it will work for all patients, irrespective of patient age, sex, body size, past history or co-morbid illnesses. However, there are frequently qualitative interactions. For example, in AMI patients, efficacious medications are more effective in risk reduction in higher risk patients such as older patients. Therefore, to find and target such higher risk patients, risk stratification testing has been developed. The most frequently applied predictors of future risk after a heart attack include: ability or duration of performing exercise (Exercise Stress Test); measure of the heart's pumping action (Echocardiogram); measure of the heart's electrical performance (ECG Holter monitor); and level of blood lipids, such as total cholesterol level or cholesterol fraction (Serum Lipid Profile).

For AMI patients, the initial drug therapies of choice are aspirin and thrombolytic therapy. Thrombolytic therapy has been utilized in several clinical trials over the past few decades in order to establish the efficacy of this therapy. A meta-analysis of nine controlled trials (Fibrinolytic Therapy Trialists Collaborative

Group, 1994) demonstrated that there was sufficient evidence that thrombolytic therapy was an efficacious treatment option for AMI patients. This analysis illustrated "a relative risk reduction (RRR) in all-cause mortality with therapy of 18% (95% confidence interval (CI) 13 to 23%)." (McAlister et al, 1999: 812). And as recognized by Ketley and Woods (1999), even though the data illustrate the effectiveness and efficaciousness of thrombolytic therapy, the utilization of this treatment has not reached its full potential.

Similarly, the use of aspirin has been conclusively established as an efficacious treatment for patients at high risk for several cardiac conditions, including AMI (Antiplatelet Trialists' Collaboration, 1994). In addition, it is has been recognized that aspirin is one of the most population-effective therapeutic options for AMI patients (Tsuyuki, Teo and Ikuta, 1994), as well as the most cost-effective one (Deedwania, Amsterdam and Vagelos, 1997). Beta-blockers have also been recognized as an effective therapy for AMI patients with a consistent beneficial treatment effect (McAlister and Teo, 1997). The use of cholesterol or lipid-lowering therapies has also been the focus of much cardiac research, because of the direct link between serum cholesterol levels and coronary heart disease (McAlister, Taylor, Teo et al, 1999). Finally, although continuing to be controversial in the medical literature, the utilization of calcium channel blockers is generally seen to be of no benefit, and even perhaps detrimental, in the treatment of AMI patients (Maclure et al., 1998). This debate, however, has had little influence or impact in changing physician practice

patterns in prescribing calcium channel blockers (Hobbs, 1997; Maclure et al., 1998).

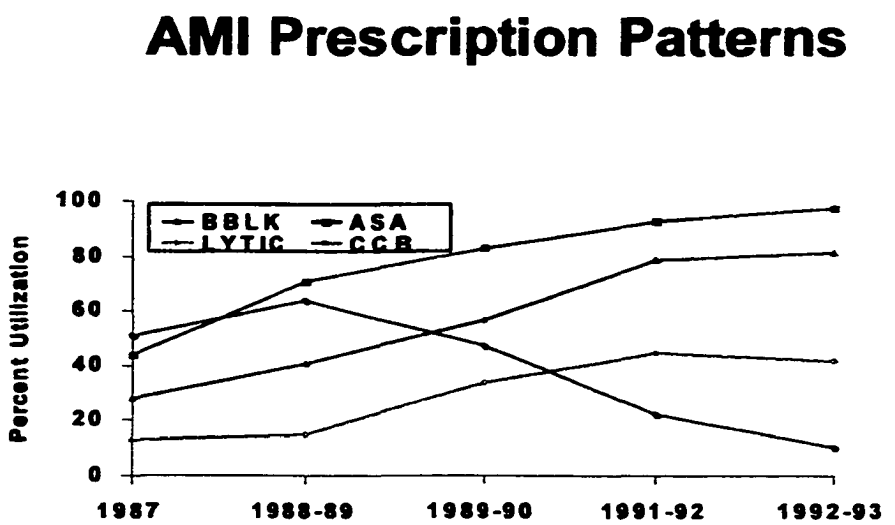
Evidence of Practice Pattern Differences in Acute Myocardial Infarction

The available trials literature, then, suggests, without question, which therapeutic treatments are beneficial for AMI patients. As might be expected with the availability of such evidence, practice pattern interventions have been initiated in many centres with varying degrees of success. An increasingly recognized, but even more puzzling, physician behaviour is the systematically less aggressive diagnostic investigation and treatment of older and female patients. This phenomenon has been repeatedly demonstrated in the treatment of AMI victims in several major Canadian centres (Tsuyuki et al, 1994; Montague et al, 1995; Teo et al, 1996a, 1996b) but has been illustrated in other settings as well (Anderson, 1996; Gurwitz et al, 1996; Krumholz et el, 1996).

The consistent AMI practice findings precipitated the current study. Five successive years of audit data collections have provided several unique findings with regard to the treatment of patients diagnosed with heart attacks and entering hospital for treatment (Montague et al, 1995). These data illustrate, convincingly, that the utilization of proven, efficacious drug treatment increased consistently over the period of study in the overall AMI patient population at risk from 1987 to 1993, partly due to regular dissemination of practice pattern information to prescribing physicians and the use of explicit practice guidelines

(Figure 1). The proven efficacious drugs included aspirin, beta-blockers and thrombolytic therapy (lysis). As well, the utilization of non-proven therapies, such as calcium channel blockers, decreased consistently over the study period. Montague et al, based on their findings, suggest that it is possible to alter the behaviour of physicians, and in consequence, improve population health outcomes.

Figure 1: Overall utilization of proven, efficacious therapies

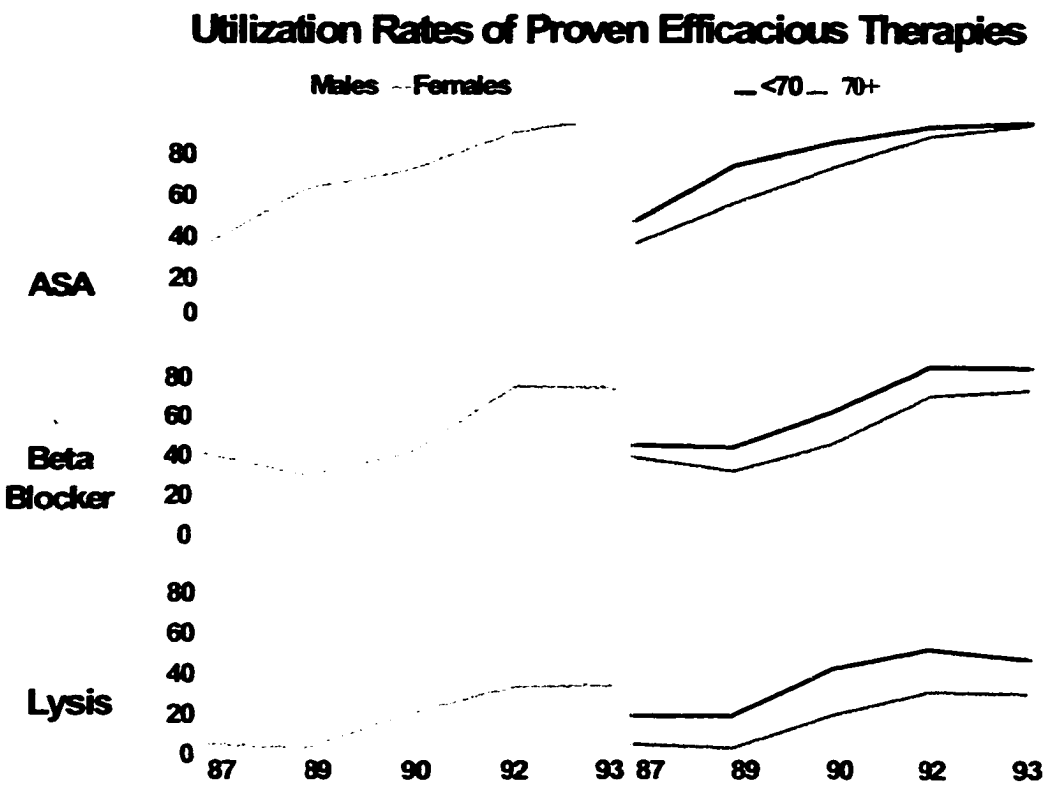


Montague. *Can J Cardiol* 1995: 11: 487.

One puzzling phenomenon, however, illustrated in Figure 2, was the consistently lower utilization of the efficacious drugs for women and the elderly, defined as those over 70 years of age, despite the biologically reasonable expectation that efficacious drugs should be most efficacious in these particular patients because of their higher risk. While the temporal utilization of the proven, efficacious

drugs for these two specific patient populations increased concurrently with the utilization for men and patients under 70 years of age, it continued to be significantly less than the male and younger patients, even at the end of five years. Although only recently generally recognized, this homogeneity of less favorable therapy for older and female patients has, in fact, been repeatedly observed for many years and for many specific diagnoses.

Figure 2: Utilization of proven, efficacious therapies, by age and sex

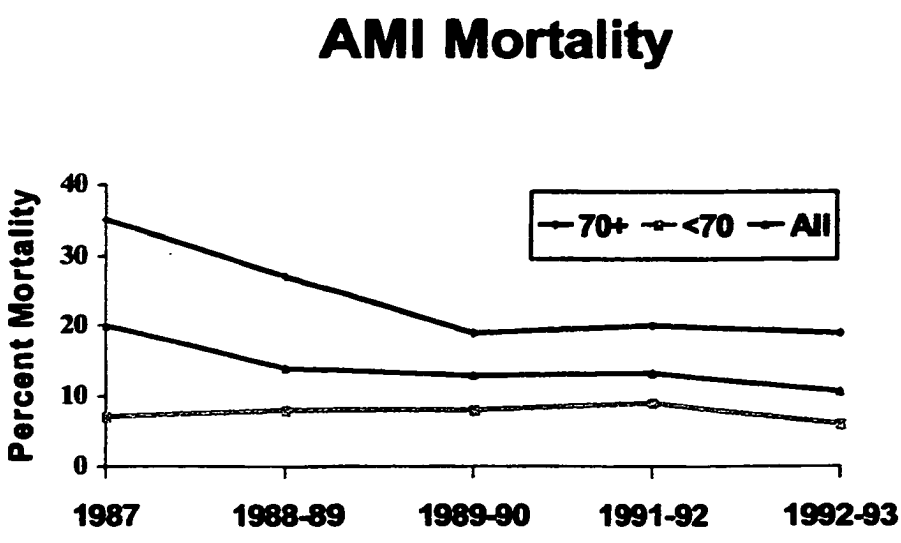


Montague. *Can J Cardiol* 1995: 11: 487.

Referring back to Poses (1999) initial question regarding the potential correlation between a decrease in variation and improved outcomes, Figure 3 suggests that, in the case of AMI, a decrease in the variation does in fact improve outcomes in the whole population at risk. As illustrated, overall

mortality rates decreased for the entire study population. More importantly, the decrease in mortality for the older patients contributed greatly to this overall decrease.

Figure 3: Change in outcome with proven, efficacious therapies, by age



Montague. *Can J Cardiol* 1995: 11: 487

Evidence of Age and Sex Based Pattern Differences in the Medical Literature

Bennet et al (1991) suggested an age bias existed against equal treatment for elderly men with prostate cancer. The study found that older men were likely to receive less intensive diagnostic services and therapies, compared with patients under 74 years of age. Another study also suggested that considerable age bias exists in the screening and treatment of elderly cancer patients (Ganz, 1992). Similarly, Lubben, Chi and Weiler (1989) found that the oldest elderly patients receive less health screening than younger patients. However, the authors

proposed that sex-based differences occur less often, and are appropriate when they occur; that is, they are due to biologic differences and not social or sexual bias. No evidence, however, was offered to corroborate this conclusion.

In a study of care provided to patients with four major medical conditions, Pearson, Kahn, Harrison et al (1992) concluded that although the care for men and women showed greater similarities than differences, the concern that sex bias in clinical decision making exists was only eased, not eliminated. Similarly for elderly patients, the literature includes examples that suggest treatment patterns are affected by patient age. Hamel, Teno, Goldman et al (1999) concluded that older age was associated with the decision to withhold life-sustaining therapies, even after adjusting for differences in the patients' prognosis and preferences.

In the treatment of AMI, several studies have illustrated differences based on age and sex. A similar finding to that of Montague et al (1995) was reported in a study involving heart attack patients at two community hospitals in Milwaukee (Sial et al, 1994) and by Venturini et al (1999) in a ten country study. The results of this study suggested that treatment with beta-blockers might be withheld for reasons other than medical contraindications, including female sex. Dellborg and Swedborg (1993) reported a sex bias in referring patients for surgical revascularization of heart patients, and also described a potential sex bias in medical prescribing patterns. Tobin et al (1987) also discussed the under-utilization of coronary artery bypass grafting in women. Gurwitz et al

(1991) investigated the use of diagnostic testing in the management of AMI using retrospective chart audit of 4109 patients in Massachusetts. The tests that were investigated included: Holter monitoring, radionuclide ventriculography, echocardiography, exercise testing, pulmonary artery catheterization, and coronary arteriography. The results of this study indicated that patients aged 65 years and older were significantly less likely to undergo exercise testing than were patients less than age 55 and patients older than age 75 were significantly less likely to undergo radionuclide ventriculography, pulmonary artery catheterization, and coronary arteriography than were younger patients. Although the study did not find any significant differences in terms of sex, the authors did conclude there was a great need for prospective evaluation of AMI treatment patterns. A similar study conducted in Ontario by Jaglal et al (1994) found that women suffering AMI undergo coronary angiography and coronary artery bypass surgery at significantly lower rates than did men.

The Origin of Practice Pattern Differences

A priori, there appears to be three potential origins of the age and sex differences in practice patterns. First, the differences may be based on relevant biologic, that is physiologic and pathophysiologic, factors that are perceptible, and reacted to, consciously or subliminally, by the trained and experienced physician. That is, physicians' may be extrapolating evidence from clinical trials, and combining this with clinical experience, thus treating sub-groups differently, but appropriately. This behaviour would be deemed appropriate from both a

biologic and a social perspective. Second, practice bias or biases, may be affecting physicians' behaviour. Third, there may be a combination of biology and some practice patterns bias. If however, any social or non-biologic bias is present in the sub-optimal prescription of therapy proven to improve outcomes, such as increased survival, it is certainly inappropriate in biologic terms and, to many Canadians, socially inappropriate behaviour as well. As Figure 3 illustrates changes in population treatment patterns for AMI that encompass an increase in utilization of proven efficacious therapies, result in much lower mortality rates for all patients, but particularly for those over the age of seventy. This is due, again, to clinical trials evidence that has determined that the relative risk reduction for AMI patients is greatest in those at highest risk, which include the elderly. Thus, explanations for treatment differences that purport to be biologically driven do not stand up to the scrutiny of available clinical trials evidence and the improved population outcomes data, particularly for the elderly and female sub-populations which are at higher risk.

While age based treatment differences have been well established in the medical literature, it appears that sex based differences are less widely accepted (Schulman et al, 1999). It has been suggested that not enough is known about the biology of heart disease in women, or about the differences in the risks, prognosis, and outcomes for women in the management of heart disease (Wenger, 1992). Nevertheless, as McGann (1994) suggested, "the weight of evidence favours the existence of bias in the treatment of men and women with

suspected or proven coronary artery disease" (328). In terms of outcomes, this is significant because women then, do not have the same survival chances either in hospital or after discharge due to the lower utilization rates for proven, efficacious therapeutic interventions (Clarke et al, 1994).

The Necessity for Further Investigation

The literature on physician decision making, as it relates to prescribing behaviour, is limited but interesting. Chinburapa et al (1993) conducted an experimental study of the prescribing decisions of 48 physicians to examine the influence of situational involvement and task complexity on the decision making process. Their results had limited generalizability due to their use of volunteer physicians, but more importantly, because the physicians were presented with every alternative available to them, which may have provided the solution to some of the participants. Denig et al (1993) attempted to determine whether differences in drug choices were related to differences in the decision-making processes of the responding physicians in the Netherlands. The investigators, however, considered and gathered ratings on factors they felt to be important to the prescribing decision, with no determination of whether these factors actually were important, or were made important by virtue of being included in the survey and the responding physicians simply answered each question. Denig et al (1993) concluded, that, in the majority of cases, physicians utilized a maximizing strategy, or the treatment deemed by each individual physician to be optimal, when aspects of the social environment and experiences were included in the

decision model. Again, investigation of prior decisions is extremely difficult, particularly in the case of experts, who may use information from their subconscious memory, or tacit knowledge base, that cannot be drawn out after the fact. Previous studies in this area of physician behaviour do not appear to deal with this particular problem. In recognition of these deficiencies, many of the earlier studies call for further work. For example, Bradley (1991) recommends that in order to further understand prescribing behaviour, it is necessary to study the underlying decision making processes. Similarly, Wolff (1989) notes that "little is currently known about their clinical reasoning process", and goes on to suggest that "at the most basic level, hypothetical patient case studies" are necessary to develop this understanding, along with collecting physician data regarding training, licensing, experience, age, sex, and the like. Despite this call to action, no such comprehensive, prospective study has yet been reported.

Overall, then, the literature suggests there are consistent treatment and prescribing differences in many cardiac diseases and surgical procedures. While the age discrepancy appears to be the greater of the two differences, irrespective of the varying ages used to define elderly, there is also evidence to suggest that differences exist in treatment and prescribing patterns in terms of sex. Further, based on clinical trials evidence and improved outcomes with appropriate care, it seems apparent that treatment differences based on age and sex for AMI patients are, at best, not appropriate to drive optimal outcomes, and,

at worst, discriminatory in nature. Although the literature reviewed for this project focused largely on cardiac disease states, it is broad based and representative and likely predictive of similar age and sex differences in practice patterns in other important disease states.

Chapter 3: Institutional Theory

As health care organizations and other relevant stakeholders continue to collect data regarding practice patterns, there are an increasing number of questions regarding the findings. Perhaps the two most relevant questions, with enormous clinical, social and fiscal impact for the health system, are: which risk stratification and therapeutic interventions do physicians order subsequent to initial diagnosis, and, more importantly, what influences these decisions? Medicine, when viewed as a continuum of science, suggests the ultimate purpose of laboratory experiments, clinical trials and continuing education is to facilitate rational decision making by those with the required training and expertise to make such decisions toward a population goal of the best health for the most people. That is, the physicians empowered with making diagnostic and treatment decisions utilize all the information available to them from various constituents toward the public good. This rational approach as to how medicine is practiced has been widely accepted, both by the medical community and the consumers of medicine.

As has been documented, however, much variation exists in terms of diagnosis and treatment of the same (or similar) disease states. Recently, clinical practice guidelines have become the latest tool used by physicians and administrators in an attempt to decrease practice variation. Such tools are seen to be a rational

(CPGs) constitute a branch of scientific review, summation and prescription refracted through the prism of health care practice" (1073). What is notable, as Lewis goes on to elaborate, is how such guidelines are implemented and the outcomes from such implementation. As in the Montague et al (1995) experience, some of the outcomes may be surprising and unintended.

It is recognized in institutional theory (as well as generally) that not all, if any, decisions are made completely rationally, with full information available to the decision-maker (Barley and Tolbert, 1997; Galaskiewicz and Wasserman, 1989). The data presented in the previous chapter suggest that while one important aspect of prescribing behaviour, an overall increase in utilization rates of efficacious drug therapy, can be altered through the use of methods such as measurement and feedback and with clinical guidelines, another underlying, ubiquitous prescribing pattern surfaced that crossed the individual level, the geographical and, indeed, the organizational level. Existing in all the centres participating in the study was the underutilization of the same drug therapies for a subset of patients. Despite its prevalence, the medical literature offers no unifying causal theory, nor has any partial attempt been made, to account for the consistent differences observed in age and sex treatment patterns. This gap in a theoretical explanation has great practical importance, as well, since it is unlikely that such consistent and persistent patterns of practice can be efficaciously altered without a meaningful understanding of their causes. A major premise of this research is the anticipation that insights from institutional

theory will assist in describing and explaining the observed prescribing behaviours.

There are various models characterizing determinants of health related behaviours, specifically decision making models. These models investigate prescribing behaviour at the individual levels, utilizing organizational behaviour theories such as biases and heuristics (Kahneman and Tversky, 1972, 1973) or image theory (Beach and Mitchell, 1990) to explain errors in judgment. The common denominator that such models share is the utilization of individual level characteristics or factors to describe prescribing decisions and judgments at the level of the individual physician. These may perhaps be generalized to a group of physicians in the same environment or institution. However, there is a lack of research that looks at the role of the institution or organization, or an organizational field, in generating and maintaining elements of health care delivery such as physician practice patterns that at first glance may appear to occur on an individual level, but that may be influenced to a greater degree by organizational factors. This is an important distinction as the organizational field that is health care is particularly novel in terms of the role of physicians in the structure of the field, as well as the emphasis on, and control of, the required education and training of health care workers. Physicians are subject to numerous and substantially different remuneration schemes depending on their employment circumstances, they usually have multiple employers including hospitals and care centres, government bodies and regulatory and licensing

agencies, and act in a novel position of both deciding on the product and service deemed necessary for the patient consumer while acting at the same time as patient consumer advocate. As well, physicians supply the education and training of individuals wishing to join the institution of physicians, set the rules and regulations regarding who can join the institution and under what circumstances, and also have colleagues and peers who determine what constitutes acceptable behaviour within the profession.

Institutional theory provides a meaningful framework through which to investigate the generation and maintenance of the age and sex-based practice pattern differences explained in the previous chapter. As will be outlined in the rest of the chapter, institutional theory suggests that organizational structures, systems and practices come to resemble one another through processes of isomorphism. It is these processes which are of particular interest in this research, as they will explain how practice patterns are formed and what mechanisms support the persistence of some practice patterns and not others.

Institutions and Organizational Fields

Prior to reviewing the various theoretical threads of institutional theory and the applicability of it for the current research, it is necessary to provide a definition for two of the basic concepts that are important for this research. First is the definition of institution. For this examination, institution will be used to mean the institution of physicians in a larger sense. Physicians have various associations

with different types of organizations, thus, it is the institution of physicians that is of interest here. That is, it is not any one hospital or group practice of which a particular physician may be a part, for example, that is the institution of interest, but rather it is the "cognitive, normative, and regulative structures and activities that provide stability and meaning to social behavior. Institutions are transported by various carriers-cultures, structures, and routines-and they operate at multiple levels of jurisdiction." (Scott, 1995: 33). This definition is shared by Barley and Tolbert (1997) who define the institution as "shared rules and typifications that identify categories of social actors and their appropriate activities or relationships" (95). A particular physician may be affiliated with numerous organizations that make up the institution of physicians, including hospitals, care centres, professional associations, research partners and networks, journal clubs, and the like. It is the compilation of these pieces of organizational life that create, for the physician, the institution in which the practice of health care occurs and as such, "physician behavior may be guided more strongly by professional norms that transcend organizational boundaries, rather than by the prescriptive or proscriptive rules of a particular organization" (Montgomery and Oliver, 1996: 657). Utilizing this definition of institution, it may be suggested that each physician specialty and sub-specialty act as an institution within a broader level of the organizational field. As Scott (1995) proposes, such institutions are thought of as being "impersonal and objective reality" (34) regardless of the involvement of individuals in constructing and maintaining these institutions. This is an important idea regarding how physician

practice patterns are generated and maintained. Institutional theory suggests that institutional practices and routines may not always reflect effective and efficient production and delivery of products and services. In terms of the provision of health care, such an idea has more implications than simply the financial impact of inefficiency or ineffectiveness. For example, such inefficiency or ineffectiveness in health care may have negative implications about the quality of care that health care consumers receive, but it would be problematic, unproductive, and likely inappropriate, to attempt to link physician practice patterns to an individual or to attempt to demonstrate that physicians knowingly maintain such structures and practices.

Much more meaningful is the recognition that organizational fields are defined in terms of the shared frameworks within which institutional members act and react, based on the shared meaning systems that have developed through repeated interaction and which persist over time and geography. Thus, the second definition is that of the organizational field. This is the level of examination at which Scott (1995) suggests "institutional forces are likely to be particularly salient." (56). The concept of organizational field was introduced by DiMaggio and Powell (1983) and is defined as "those organizations that, in the aggregate, constitute a recognized area of institutional life: key suppliers, resource and product consumers, regulatory agencies, and other organizations that produce similar services or products." (148). This allows the analysis to focus on the organizational field of health care delivery in Canada and includes all aspects of

institutional life that may influence physician practice patterns or "the totality of relevant actors (DiMaggio and Powell, 1983: 148). As Scott (1995) concludes, the organizational field suggests a "community of organizations that partakes of a common meaning system and whose participants interact more frequently and fatefully with one another than with actors outside of the field" (56). As such, it is not possible to fully define an organizational field except through empirical investigation. The organizational field comes about through the distinct history of action and interaction that defines the institutions included in the field (Barley and Tolbert, 1997). Thus, it is the institutional actors who will ultimately define the field. A priori, however, it is realistic to suggest that the organizational field under study includes, but is not limited to, hospitals, community care centres, group and solo physician practices, referring physicians, medical schools and universities, all manner of health care suppliers such as pharmaceutical firms, funding and regulatory agencies; professional associations, as well as formal and informal research networks, and public (government) and private payers.

Some may argue that the relatively ambiguous definition of institutions and organizational fields is problematic (Czarniawska and Wolff, 1998), however it is exactly this lack of specificity that allows for heretofore unrecognized influences that define the potential isomorphic mechanisms that, in turn, allow homogeneity of practices to come into being and to be maintained. And while institutional theory seeks to explain organizational similarity rather than variance, it could not be referred to as a single, unified theory. Rather, it is a

collection of related theories that provide an explanation for organizational similarity and examines the methods by which institutions provide stability as well as meaning to the behaviour enacted by organizational members. There are, however, differences in the theoretical bases from which each explanation begins.

A Brief History of Institutional Theory

The current management literature contains several reviews of institutional theory's origins and the tenets of the theory. As outlined by Scott (1987) the earliest origins of this theoretical framework came from the work of Selznick, which suggested that to institutionalize an organizational structure or practice was to infuse it with value beyond the technical requirements of either that structure or task. From that early work there came to be essentially two streams of institutional theory, commonly labelled old institutional theory and neo-institutionalism (Powell and DiMaggio, 1991). Both streams share in a skepticism toward the rational actor models of organization. That is, the earliest discussions of institutional theory attempted to account for what the authors believed to be the organizational reality they observed. There is an emphasis on the relationship between organizations and the environment, rather than excluding or ignoring the context within which an organization exists. As well, institutional theory reveals aspects of organizations that are inconsistent with the formal accounts put forth by the organization and that are outlined in other theoretical perspectives. Finally, both streams of institutional theory attach

much significance to the role of values in shaping what is viewed to be the organizational reality.

Early institutionalism sought to explain how the goals of the organization changed over time, including how the operative ends of the organizations came into being, based on the forces that occur in the environment and compel organizational participants to modify the organization's goals to better exist in what was often a hostile environment. In this manner, it was more a political analysis of organizational members and their interaction with the environment (Scott, 1995).

Neo-institutionalism originated with the work of Meyer and Rowan (1977) and emphasized clearly that organizations are open systems and are strongly influenced by the environment within which they exist. Again, organizations are seen to experience pressures to adapt, but neo-institutional theory suggests that these pressures are not the result of rational pressures for more effective and efficient performance by the organization, but rather are social and cultural pressures to conform to conventional beliefs (Zucker, 1988). As Barley and Tolbert (1997) explain, institutional theory highlights cultural influences on decision making and formal structures. "It holds that organizations, and the individuals who populate them, are "suspended in a web of values, norms, rules, beliefs and taken-for-granted assumptions that are at least partially of their own making" (93). This is a particularly vivid description of how institutions come to

be homogeneous and what types of elements maintain them in this state. Meyer and Rowan (1977) suggested that formal organizational structures have a symbolic function, in addition to their action-generating properties. These structures can serve to communicate information about the organization to constituents both within, and outside, the organization.

It is important to note at this point, that it is not those characteristics of a single organization or entity that are of interest, but rather that the focus is on the "organizational field" (DiMaggio and Powell, 1983) or "network of organizations" (Greenwood and Hinings, 1996) due to the ubiquitousness of the phenomenon of interest. It seems likely that the same notion could be applied to organizational practices that are visible and/or important to one or more constituents of the organizational field. This was an important new direction in institutional theory in that it recognized that much of what occurs within an organization is influenced by ideas and values that began, or were recognized as being outside the formal boundaries of the organization.

The emphasis of subsequent research shifted, then, to belief systems. As Scott (1987) outlines, this led to four rather important changes in the current direction of organizational theory. The role of cultural elements within the organizational environment is stressed, as well as the sources of these elements. This is an enormous change with respect to many of the other prevalent perspectives within organizational theory, which have focused on elements such as the

technical requirements, resource streams and the flow of information within the organization.

Second, there is rather less emphasis on institutionalization as a taken-for-granted process. The theory suggested that organizations conform to a set of institutionalized beliefs because doing so increases the organization's legitimacy, resources and survival capabilities. Third, attention is given more to the nature of the belief systems rather than the process of institutionalization. Finally, attention was shifted from traditional environmental factors such as the market, resources and customers to the role that other actors, such as the state and professional associations, have to play in influencing day-to-day organizational life. These changes increasingly recognized the expanded role of the institutional environment and the consequences of such influences, on a general level.

One criticism of this shift was the notion that organizations and organizational actors appeared to be unthinking and unresponsive. This is a criticism that could potentially have a great deal of impact on the current research, if unresolved. In the same vein, a significant drawback of institutional theory is its seeming inability to deal with factors such as interests, power, agency and organizational change. Recent developments in both these areas have attempted to incorporate these elements into the theoretical framework

(DiMaggio, 1988; Oliver, 1991, 1992; Greenwood and Hinings, 1996; Tolbert and Zucker, 1996).

DiMaggio and Powell (1983) suggested that highly structured organizational fields bring about lack of variation in institutions. Such environments furnish "a context in which individual efforts to deal rationally with uncertainty and constraint often lead, in the aggregate, to homogeneity in structure, culture and output" (147). In an organizational field facing the same set of environmental conditions, the authors argue that the process of isomorphism is at work, which impels organizations in the field to resemble each other. Further, three types of institutional isomorphism are identified: coercive; mimetic; and normative. This was an important contribution to the theoretical position as it more clearly identified how homogeneity might occur within an organizational field. That is, the mechanisms by which organizations come to resemble one another. It is highly appropriate to utilize institutional theory and the concept of isomorphic mechanisms because as long as "isomorphism of the organizational field is maintained, little variation on outcomes among organizations should be observed" (Kondra and Hinings, 1998: 745). As previously outlined, it is this remarkable lack of variation of practice patterns that is under scrutiny in this research.

Mechanisms of Isomorphism

The mechanisms of isomorphism which DiMaggio and Powell (1983) introduced have become the basis for much of the empirical research that has been conducted in the area of institutional theory. Mimetic isomorphism, which has received the majority of the effort in this area (Mizruchi and Fien, 1999), occurs through imitation of organizational structures and practices in the presence of uncertainty or when the goals of the institution or institutional actors are not well understood. Certainly in the practice of medicine, while much has been learned and discovered through the centuries, there are many important and far-reaching questions yet to be answered. Thus, the level of uncertainty surrounding diagnosis and treatment decisions in many fields would set up a definite context that would allow for, or perhaps necessitate, imitation, particularly in the case of specialties, where publications, physician opinion leaders, and those organizations which are viewed as being successful, may influence practice patterns. That is, institutional actors model their practices based on the perceived success or legitimacy of others in the organizational field.

DiMaggio and Powell (1983) link normative isomorphism to the notion of professionalism. Two aspects of professionalism are pointed out as being important to the normative isomorphic process. First "is the resting of formal education and of legitimation in a cognitive base produced by university specialists" (DiMaggio and Powell, 1983: 152). This enhances the diffusion of

professional norms for behaviour via various mechanisms such as socialization and professional training. Second is the span of activities associated with professionals, which occurs across and outside of single organizational boundaries. This permits new models of institutional structures and activities to be diffused quickly. Both of these aspects of professionalism are important in terms of uncovering the origins of practice patterns as well as their maintenance as they allow for mechanisms which cross time, geography and personnel.

Coercive isomorphism, as outlined by DiMaggio and Powell (1983) can be either formal or informal pressures to conform. "Coercive isomorphism results from both formal and informal pressures exerted on organizations by other organizations upon which they are dependent and by cultural expectations in the society within which organizations function" (150). While there may be "direct and explicit" (151) demands on organizations to conform to a prescribed structure or procedures, the pressures to conform may also be extremely subtle. Dependent organizations may not overtly recognize the pressures that come to the fore when decisions are being made regarding structure and actions.

In summary, it is apparent that the three processes of isomorphism are grounded in different perspectives regarding how behaviour permeates throughout institutions. Coercive isomorphism results from pressures felt by an organization from other organizations upon which they are dependent and from pressures to conform to the cultural expectations that are evident in society. Mimetic

isomorphism is a response to uncertainty that motivates organizations to reduce such uncertainty by imitating other, usually successful and legitimate, organizations. Finally, normative isomorphism is the result of the process of professionalization (Mizruchi and Fein, 1999).

It is important, too, to recognize that, while theoretically, the processes of isomorphism appear to be distinct, in reality, it may be extremely difficult to delineate them as clearly in empirical work. As Mizruchi and Fien recognize, much of the work in institutional theory failed to distinguish or bring clarity to the distinction between the three processes. However, "the alternative, which is neglecting to recognize the distinction, seems far less desirable than the ambiguity with which we are faced" (Mizruchi and Fien, 1999, 667).

The Influence of Institutional Actors

The recognition of the complexity and ambiguity of the mechanisms of isomorphism relate also to the actions and reactions of institutional actors. If we return to the aforementioned criticism of institutional theory regarding the institutional actors appearance of being unthinking and unresponsive, one may question why physicians appear to accept and offer inappropriate patterns of patient treatment. One can return to the literature to determine that such an assumption is misguided. This is not surprising if it is recognized that institutional environments are not without their contradictions. "Thus, although we stress that rules and routines bring order and minimize uncertainty, we must

add that the creation and implementation of institutional arrangements are rife with conflict, contradiction, and ambiguity." (DiMaggio and Powell, 1991: 28) One can look, for example, at the issue of performance measurement in guiding behaviour. As has been argued, the rigor of performance standards and outcomes measurement may influence greatly the effects and continuity of isomorphism. But as Kondra and Hinings (1998) argue, performance standards themselves are likely to be institutionalized, particularly under conditions in which there are relative, rather than absolute, outcome measurements. While it may be argued that clinical trials provide absolute performance expectations in terms of therapeutic interventions in AMI, neither individual physicians nor institutions are generally measured in these terms. That is, their behaviour is not usually compared to the 'optimum' behavioural patterns that would be predicted by clinical trials evidence.

As well, similar to shareholder difficulties with monitoring organizational performance, patients and professional and regulatory bodies are unable to measure and judge the outcomes of individual physicians or even institutions of physicians. Global outcome measures such as national levels of infant mortality and life expectancy do not provide such measures. So it can be seen that outcome measures are uncertain and often crudely measured, if at all. Other institutional stakeholders have great difficulty obtaining such measures and even institutional actors may be constrained by institutional factors from recognizing inappropriate practices and from attempting to revise them if they are

recognized. As long as institutional outcomes do not differ significantly, using crude measures, from other institutional outcomes, it is unlikely that such institutionalized practices will be recognized or altered.

Institutional theory then, would argue that this lack of absolute performance measurement contributes to a specific institutionalized range of behaviours and hence, outcomes. And, if an institutional actor attempts to bring these institutional inefficiencies or shortcomings to light, institutional effects again constrain such behaviour, making it difficult, if not impossible, for the institutional actor to propagate such knowledge. Akin to the Kondra and Hinings (1998) description of risk averse managers, individual physicians may be generally too risk averse, in terms of professional standing and the associated returns of such standing, to go against institutional norms that are recognized, explicitly or implicitly, in the organizational field. "Isomorphism can be self-serving to the dominant coalition: if all organizations 'play by the rules' everyone gets to keep their jobs, thereby providing a strong incentive not to question institutional norms and simply take them for granted, further entrenching an institutional environment (748).

In response to these same criticisms of a lack of incorporation of action and interests or power in the institutional framework, Oliver (1991) developed a conceptual framework that identified multiple strategic responses to institutional pressures. This framework suggests that institutions, and the actors therein, do

have responses available to them given the existence of pressures for conformity. Such responses or strategies range from acquiescence to manipulation, with varying tactics within each of the five strategies identified. This work attempts to define the circumstances in which each potential response to institutionalization might be enacted. As Oliver proposes, organizations do, in fact, have various responses to pressures for conformity available to them, "from conforming to resistant, from passive to active, from preconscious to controlling, from impotent to influential, and from habitual to opportunistic, depending on the institutional pressures toward conformity that are exerted on organizations" (151).

One might argue, at the organizational field level, power and agency could influence which institutional pressures for conformity are propagated and which are actively resisted and thus have little or no effect on the institutional state, in terms of which individual or group of individuals in the field has the most power or influence, which in turn determines which behaviours become institutionalized and are maintained in the institutionalized state. Goodrick and Salancik (1996) argue a similar point. They suggest "that there may be a core set of institutions or institutional standards for which agreement exists and others at the margins for which it does not" (2). If institutional practices or behaviours do come to resemble norms, values or beliefs that come to resemble something that is taken-for-granted or social facts, "agents' interests in them are constant and thus irrelevant in explaining the practice" (Goodrick and Salancik, 1996: 2). This may

be an important idea in understanding how specific practice patterns are generated and maintained, even in the face of providing questionable value or inappropriate care for a group of patients.

Goodrick and Salancik (1996) go on to suggest that, where uncertainty exists, interests and agency come into play, as the lack of certainty provides some latitude for enacting these interests. They also state that "when the standards for activities are certain, which means players agree on what is appropriate to do, practice will be completely determined" (3). The phenomenon of interest for this study, AMI practice patterns, may be an exception to this rule. However, it appears that there may be a more complicated connection between institutional environments and the corresponding behaviours or practices than has been illustrated by previous empirical work in this area. This research suggests that the standards for activities are certain, and on average, the players agree on what is appropriate. However, it is being argued here that rather than having practice completely determined by such certainty, isomorphic mechanisms may somehow constrain the utilization of such certain knowledge and thus, constrain behaviours. It is not only in the presence of uncertainty, it would seem, that the consequences of isomorphism are apparent and significant.

Alternatively, one might begin to regard uncertainty not in terms of knowledge of clear and appropriate practice patterns, but rather in terms of institutional values. "Complex societies typically hold conflicting goals and beliefs, any of which can

be used to rationalize and justify particular practices" (Goodrick and Salancik, 1996" 5). If institutional values are unclear, this may be reflected in behaviours within the institution that are constrained by the interests and values of the dominant group, in this case the physicians. The question becomes one of identifying if there are institutional constraints that push the institution, and individual physicians, to behave in particular ways, even in the face of other, clearly identified institutional certainties.

Institutional theory is the lens through which physician practices can be viewed. It provides a platform with which to examine "multiple, potentially incompatible, and/or ambiguous environmental pressures (Montgomery and Oliver, 1996: 650) and the necessary framework that will allow a credible and meaningful interpretation of the results. As Covaleski, Dirsmith and Michelman (1993) reason, in the health care environment, institutionalization is not yet finished, "wherein the active agency of individuals and organizations is subjected to systematic examination" (65). The authors reflect on the issue of institutionalization both as a state and as a process, as similarly put forth by Tolbert and Zucker (1996). The authors suggest that institutionalized outcomes or practices may be beyond the reach of interest or power, so fully are they ingrained in the institutional fabric. "By contrast, institutionalization as a *process* is profoundly political and reflects the relative power of the organized interest and actors who mobilize them" (66).

Greenwood and Hinings (1996) also suggest that institutional theory is, in fact, an appropriate theoretical basis for examining issues of agency and change. A feasible a priori hypothesis is the present study may well illustrate that responses to institutional pressures are not necessarily an either/or situation. As previously suggested, there may be facets of practice patterns to which physicians are able to respond in one fashion, with other facets that are unresponsive, either due to a shared and explicit or implicit notion regarding the legitimacy of the practice, or are taken for granted in some other manner that is not recognized by the organizational actors. As emphasized in Tolbert and Zucker (1996), practices are not equally institutionalized depending on their longevity or on the level of acceptance of the practice. It is appropriate to turn to the work of Oliver (1992), that recognizes institutionalized processes may indeed become deinstitutionalized, that is, there are conditions which may be present which contribute to certain processes being more susceptible to deinstitutionalization than others. Oliver outlines organizational and environmental factors that "may determine the likelihood that institutionalized organizational processes and behaviors will be vulnerable to erosion or rejection over time" (563). This seems to be an important notion to develop for two reasons: it recognizes that institutionalized structures, processes and behaviours can indeed change over time; and, it could potentially assist in defining those specific behaviours that are not as vulnerable to deinstitutionalization, thus illuminating how, or by what mechanisms, institutionalized behaviours become resistant to change. In the examination of

institutionalized patterns of practice, it is especially helpful to identify any potential antecedents of deinstitutionalization that could assist in the analysis.

Generally, Oliver (1992) offers three categories or pressures for deinstitutionalization: political; functional; and, social. Additionally, moderators of the rate of deinstitutionalization are proposed, these being entropy pressures (which serve to accelerate deinstitutionalization) and inertial pressures (which tend to hinder the process of deinstitutionalization). Of the twelve antecedents differentiated by the level of analysis, either organization or environment, several of the antecedents may be salient in the current health care environment and could give clues to the insitutionalized, and potentially deinstitutionalization of, behaviour within this environment.

Political pressures at the organization level that appear to be salient include mounting performance crises and conflicting internal interests. As Oliver notes, these "two mechanisms of deinstitutionalization are intraorganizational factors that erode political agreement on the value or validity of an institutionalized organizational practice" (568). There is a question then regarding the existence or recognition of a performance crisis and conflicting internal interests which might begin the process of eroding institutionalized practice patterns, which in turn, may offer clues as to the mechanisms that, in fact, create and maintain institutionalized processes. One major performance crisis in health care seems to have been derived from intense federal and provincial funding reductions,

which have also resulted in conflicting internal interests as the autonomy and decision making power of health care workers appears to be eroded by continued attempts by administrators with growing power and authority. As previously argued, practice pattern variation has come to light in North America, in no small measure because of the administrative attempt to contain costs and better predict the care patterns for specific medical and surgical conditions.

Responses to this crisis follow a process of deinstitutionalization as outlined by Oliver: "Under these conditions, the logic of confidence (Meyer and Rowen 1983) and institutional coherence that have perpetuated institutionalized rules of appropriate conduct begin to break down and destabilize, as shared expectations of acceptable and legitimate activity become supplanted by the pursuit of organizational interests and individual protection." (569). One response by physicians has been the proliferation of consensus building around the creation and adoption of guidelines of care in an attempt to deal with the crisis and to prevent the breakdown of the institutional coherence of physicians. Interestingly, while changes in practice patterns can be identified, in AMI for example, as perhaps one response to the identification of the performance crisis of variability of care, the underlying treatment differences with respect to age and sex seem to be immune to the presence of factors for deinstitutionalization. As well, the restructuring of the health care delivery system has developed conflicting interests, most especially between physicians and administrators, regarding the value of particular practices. It might be argued that the

institutionalized value of physician autonomy to make all the decisions regarding the care of the patient has been called into question. This is no doubt inextricably linked to the performance crisis. Various responses by individual physicians and physician groups to deal with this conflict have been proposed and enacted, in order to maintain the position of physicians within the health care system. None of these responses seem to have shaken the institutionalized nature of the differences in treatment patterns for elderly and female patients. An underlying reason for this, as Oliver argues, may be that current powerful stakeholders must, as a prerequisite for improvement, recognize that current performance is inadequate before pressures are felt to improve performance. And, the current combative environment, combined with the severely institutionalized medical regime in Canada labouring to maintain the current power distributions, have worked to sublimate the potential performance inadequacies in a quagmire of health care issues which remain, on the whole, unrelated to pattern of practice and outcomes analysis.

All of this relates to the next potential antecedent of deinstitutionalization, that of functional pressures. As previously related, in institutionalized arenas, goals may often be ambiguous, which allows practices to become institutionalized without their value, validity or contribution being called into question. Changes to the level of ambiguity, however, can lead to deinstitutionalization. "Anything that acts to increase an organization's technical specificity and reduce the ambiguity of an organization's processes and outputs will provide fertile ground

for the deinstitutionalization of organizational studies" (572). It may be argued that there are pressures to change or specify goals more directly. Such goals, for example, turn up in the measurement of the number of hospital days for specific medical or surgical events, the measurement of waiting lists and times, and changes in previously institutionalized patterns of practice, such as long hospital stays subsequent to uncomplicated childbirth, based on these new, seemingly unambiguous and more specific goals. However, these latter types of goals seem to be acting as surrogate measures for decreased variation in practice patterns and outcomes and do not get at the fundamental beliefs and values which constitute the how and the why of physician practice pattern behaviour, and therefore, do not ultimately destabilize those behaviours which are deeply institutionalized.

One antecedent of deinstitutionalization cited by Oliver which may, however, assist in the search for understanding the institutionalized nature of patterns of practice behaviour is the notion that "dissonant information or unexpected, irrefutable events in the organization's environment often emerge to discredit or challenge the utility of the operating assumptions of organizations. Although these events and data may be idiosyncratic, non-repetitive and unpredictable, their consequences may be profound in terms of deinstitutionalizating existing beliefs and activities" (574). As has been evidenced, practice pattern variation is beginning to be disseminated, and while the current focus seems to be on reducing variation in the absence of understanding its source, this information

may be nudging the medical establishment to begin to question the underlying values and beliefs which institutionalize practice pattern behaviours, and thus begin the process of deinstitutionalization. The present research may well be one of the starting points that adds to the widespread initiation of such a process. Oliver may provide an important clue then, in understanding the persistence of practice pattern behaviour, such that, in the absence of unexpected, irrefutable and prolonged evidence to the contrary, physician behaviour will remain unchanged.

The absence of these antecedents of deinstitutionalization, or the presence of them focussed on, intentionally or otherwise, other institutionalized behaviours, can guide the search for insight into institutionalized processes of practice pattern differences of interest in this research. Specifically, the antecedents of deinstitutionalization may be loosely related to mechanisms of isomorphism, in the sense that these pressures are actually related to isomorphic pressures, but are driving the institutions to change institutionalized behaviours and processes, which may themselves then become institutionalized. They may even be defined as, or connected to, coercive, mimetic and normative mechanisms. It may be legitimate to define the opposite of these antecedents as factors that could be in place which maintain institutionalized behaviours. In that sense, they aid in recognizing factors contributing to institutionalized behaviours. For example, it has been argued that there is a mounting performance crisis. However, its focus is not on specific activities of physicians, such as practice pattern differences

and outcomes based on clinical trials evidence, thus, deinstitutionalization of the activities associated with these types of behaviours would not be expected. Similarly, while conflicting internal interests are definitely on the rise, again, the focus appears to be on maintaining the power and privileges currently associated with the institution, and any individual that may speak out finds that the dominant coalition is still strong and going against institutional norms is not in one's own best interest, thus further favoring entrenchment of the institutionalized behaviour.

Oliver's (1992) assertions, similar to Mizruchi and Fien (1999), do point to the complex linkage of mechanisms, both in terms of institutionalization and deinstitutionalization. One factor is often inextricably linked with another, rendering analysis difficult, but not impossible. And, the delineation of such factors, from a theoretical perspective, supports such investigation, particularly at the formative stages of inquiry.

Understanding Legitimacy

In attempting to utilize these theoretical strands, it is recognized that few empirical studies employing institutional theory have attempted to utilize or test for the impact of all three types of isomorphic mechanisms (Mizruchi and Fein, 1999). However, as DiMaggio and Powell (1983) point out, these mechanisms are not necessarily entirely distinct and from this perspective it is important to be open to all and any sources of isomorphism in order to fully define the patterns

that will emerge. As has been discussed, institutional theory has become a well-developed perspective within organizational analysis that seeks to formally investigate and explain the homogeneity, or similarity of organizational structures and practices. It brings to the fore the "extent to which firm behavior is compliant, habitual, unreflective, and socially defined." (Oliver, 1997: 699). However, institutional theory also suggests that a principal reason organizations adhere to dominant practices in their particular organizational fields evolves from a deep, and widely perceived, sense of organizational need for recognized legitimacy (Oliver, 1991; Montgomery and Oliver, 1996). And, conforming to the prevailing institutional norms can attain organizational legitimacy. Meyer and Rowan (1977) are clear about an organization's need for legitimacy in order to be successful and survive. Isomorphism, a process that constrains a unit in a population of units facing the same environmental conditions to resemble each other (DiMaggio and Powell, 1983), occurs as a means of gaining legitimacy. Organizations are a reflection of the institutionalized environment in which they operate.

Organizational legitimacy, is defined by Deephouse (1996) "as a status conferred by social actors" (1025). The actors that confer legitimacy, in this case, are likely the physicians, and physician groups, that endorse specific means and/or ends of the institution. Because individual physician practice patterns are essentially invisible to the institution, legitimacy will likely only be questioned when the means or ends of physician behaviour are questioned in a

relatively public manner. That is, the practice pattern is brought to light by reason of an adverse event. In terms of practice patterns, legitimacy is likely primarily conferred by physicians and physician institutions, rather than by regulators and the general public as Deephouse (1996) found these have relatively little knowledge of practice patterns and their consequences.

Such an environment generates rationalized myths of organizational structure that propel organizations to act in a certain manner or maintain certain structures in order to be accepted by that same environment. It is the consequences of isomorphism which are an important element in discussing physician practice patterns. These consequences include incorporating elements into the institutional operations that are legitimated externally, rather than being in place to enhance the efficiency of the institution. This brings about an institutional language that supports structures, goals, policies and procedures which "account for the activities of individuals" (Meyer and Rowan, 1977: 349) and may be relatively unrelated to the efficiency of the institution. The result of this can be a decoupling of the structures of the institution and the activities within the institution. This decoupling protects institutions from rigid evaluation regarding their technical performance and such activities are handled informally. "Thus, decoupling enables organizations to maintain standardized, legitimating, formal structures while their activities vary in response to practical considerations" (Meyer and Rowan, 1977: 357).

One can see this may be the case with physicians' activities and how the technical aspects of giving care or treating patients are measured. There are rarely rigorous, standardized measures of outcomes that are applied to specific patient populations "because much of the work that physicians do in hospitals is not visible to, evaluated by, or easily monitored by other constituents, administrators, or regulators (Freidson 1970a, 1970b)" (Montgomery and Oliver, 1996: 657). Legitimacy in the field of health care is gained more from "affiliating their efforts with the widely revered social values of rationality, efficiency and science" (Carpenter and Dirsmith, 1992: 42). It is argued that such an affiliation is more an attempt to gain legitimacy and ensure the perception of efficiency and effectiveness through facts and science, rather than the reality of how physicians practice medicine and make decisions. As Covaleski, Dirsmith and Michelman (1993) outline from Freidson (1986), this decoupling occurs in the field of medicine to some extent between the practitioners and the administration entities within the institution. "Lacking control over policy making and resource allocation, practitioners exercise power over the generation of resources in that they are the ones who meet directly with their clients (or here, patients) and perform the actual service delivery work" (67). We may also see this decoupling taking place between the scientific research efforts of the health care community and, again, the actual delivery of the patient care. The association of the scientifically oriented health research community with the practice of medicine bolsters the appearance of rational, effective and efficient medicine, and thus

the legitimacy of the work. However, there does appear to be a decoupling of the structure of the field from the actual practices occurring.

As well, Meyer and Rowan (1977) submit that institutions resolve the conflict between institutional effects and efficiency needs by the logic of confidence and good faith of the institutional actors. These actors are able to retain the structure of the institution and deal with the uncertainty created by the decoupling and maintain confidence by believing that they and other institutional actors will behave in good faith. DiMaggio and Powell (1983) suggest also that it is the actors attempts to deal, in a rational manner, with uncertainty and constraint which results in "homogeneity in structure, culture and output" (147). It follows that these same actors, then, are part of the creation and maintenance of structures and practices that may be in place, not necessarily to enhance the goals of the organization, but rather to communicate information about the organization to internal and external constituents in order to gain and sustain legitimacy. It is clear in the case of physicians that such activities may not contribute directly to improving outcomes of the institutions in terms of patient care.

A Framework for Understanding Institutional Theory and Isomorphic Mechanisms

Scott (1995) with his description of the distinctive nature of neo-institutional theory provides an excellent summary of the various schools of thought regarding institutional theory. He defines institution as consisting "of cognitive,

normative, and regulative structures and activities that provide stability and meaning to social behavior. Institutions are transported by various carriers-cultures, structures, and routines-and they operate at multiple levels of jurisdiction" (33). Scott goes on to describe what are termed the three pillars of institutions: the regulative, the normative, and the cognitive to allow for the varying emphases that institutional theorists have provided in past research. The three pillars are defined around "three axes of controversy" (34) which are the emphases, carriers and levels of institutional elements. Since the level of analysis has already been defined as that of the organizational field, and as being that level at which institutional forces are likely to be particularly relevant, the following discussion will develop the application of institutional theory to the practice pattern phenomenon in terms of the emphases and carriers of institutional elements.

The regulative pillar is closely associated with the notion of coercive isomorphic mechanisms. DiMaggio and Powell (1983) propose that coercive isomorphism is a result of formal or informal pressures exerted towards an organization by other organizations upon which they are dependent and also by the cultural expectations in the society in which the organization operates. Such pressures may be felt as force or may be realized in terms of persuasion or even invitations to join in collusion. As Scott (1995) outlines, this type of pressure has a basis of compliance centred on expediency, that is, following the rules, laws and sanctions that constrain and guide behaviour. This is the most conventional

view of institutions and institutional actors in that it emphasizes the idea that individuals act in ways in which their own interests are best served. That is, they make rational decisions based on cost/benefit evaluations and act in ways that maximize their benefits and minimize the costs. In this way, compliance is the easiest method of minimizing any costs, such as punishments or sanctions and maximizing benefits such as rewards.

The normative pillar describes a theoretical base in which there is an emphasis on normative rules, including both norms and values, which define what institutional goals should be, and also the appropriate manner in which to pursue those goals. It is in this particular pillar that the idea of roles, or norms and values that apply to a particular set of institutional actors or their positions, is brought out. Normative expectations become important in terms of what institutional actors are supposed to do. As Scott (1995) suggests, "the expectations are held by other salient actors in the situation and so are experienced as external pressures by the focal actor. Also, and to varying degrees, they become internalized by the actor" (38). The normative pillar, then, seeks to examine how norms and values, which "are both internalized and imposed by others" (40) provide a stabilizing influence.

It is within this pillar that normative isomorphic mechanisms are apparent. Normative rules do not only constrain behaviour, they also "empower and enable social action (Scott, 1995: 38). This is an important concept, as it does allow for

the notion that, particularly in the professions, such rules bestow institutional actors with certain rights and privileges that influence behaviour. Normative mechanisms guide and control behaviour through socially mediated values and normative frameworks, which implies that such behaviour occurs because it is expected and the actors are morally obligated to act in a certain manner. This suggests that the institution of physicians has its own normative framework that influences physicians' behaviour in certain directions.

The final pillar, the cognitive pillar, shifts its focus to exploring "the rules that constitute the nature of reality and the frames through which meaning is made" (Scott, 1997: 10). "The coherence of social life is due to the creation of categories of social actors, both individual and collective, and associated ways of acting" (44), which suggests that as individuals construct the reality within which they live and work, the types of behaviour that are normal and acceptable become well defined and other responses or acts become inconceivable. Scott (1995) illuminates the important difference between normative and cognitive approaches. Whereas the normative approach is concerned with roles of individuals and groups and the normative expectations associated with these, the cognitive approach is concerned with social identities, that is, who we are and what actions are appropriate in certain situations.

As might be expected, Scott has placed the mechanisms of normative and mimetic isomorphism in the normative and cognitive pillars, respectively. If one

looks more closely at the definitions of these mechanisms we can see how they do, in fact, fit with these varying approaches. Normative isomorphism is established mainly by professionalization so it is clear how the notion of roles and the appropriate behaviour associated with particular roles fits with this conception of institutional theory. Roles within specific professions appear to be well defined with recognized norms of behaviour. Mimetic isomorphism is a response, in an institutional setting and by institutions and institutional actors, to uncertainty (DiMaggio and Powell, 1983). This definition fits with the social constructutionist nature of the cognitive pillar, in that social actors will try to act in conventional ways as well as to imitate those that, in our socially constructed reality, are viewed as being successful or superior.

In the context of the present research, the processes of institutionalization are of particular interest in examining the apparent age and sex differences in prescribing and treatment patterns for heart disease patients. How do organizational practices come into being and persist over time and with frequently changing personnel? There are several aspects of interest in the examination of the practice pattern phenomenon. The first, as previously mentioned, is the startling homogeneity of the practice patterns in the AMI data and, as evidenced by the literature review, in other areas of medical practice as well. This obvious homogeneity lends itself to study through the institutional theory lens. Institutional theory allows an investigation of practice patterns that

can define isomorphic mechanisms which influence decision making in terms of treatment patterns at the organizational field level.

Previous work in this area is scant so it is desirable, in fact necessary, to include the possibility that all three mechanisms are at work in the generation and maintenance of practice patterns. This will preclude the possibility of ignoring valuable and meaningful insights that might occur from the elimination of one or more of the isomorphic mechanisms in the analysis. It is possible, also, based on the preceding discussion, to put forth the following proposition:

Proposition 1: The existence and influence of normative isomorphism on physician practice patterns for AMI will be greater than that of mimetic, which will be greater than that of coercive isomorphism. That is, normative isomorphic mechanisms > mimetic isomorphic mechanisms > coercive isomorphic mechanisms.

As DiMaggio and Powell (1983) and Scott and Backman (1990) have noted, professions and the professional context, play a major role in defining the institutional structure and practices. Such professional groups are "more likely to be guided by the norms and standards of collegial groups beyond organizational boundaries" (Scott and Backman, 1990: 24). Scott and Backman (1990) submit that the professions, more so than any other group, are able to control their environment to a great degree. This control is exercised by the ability to control the belief systems. "They exercise control by defining reality --

by devising ontological frameworks, proposing distinctions, creating typifications, and fabricating principles or guidelines for action" (29).

What can be seen, then, are mechanisms of isomorphism (coercive, mimetic, or normative) that may be influencing the process of institutionalization of practice patterns. Indeed, there may be one or more mechanisms at work at any given time. However, due to the uniqueness of the structure of the field and the institutions within the field, the preceding proposition is offered as recognition of this uniqueness and the likelihood that one type of isomorphic mechanism is likely to be dominant.

Mimetic isomorphism has generally been related to the existence of some level of uncertainty, as previously argued. For example, Goodrick and Salancik (1996) investigated practice patterns involved in cesarean births and argued that uncertainty provides discretion and that uncertainty will be at its highest in the case where institutional standards are most uncertain. The authors suggest then, that institutional standards will confine or constrain practice when uncertainty is low. If, however, uncertainty is high, then organizational actors will impose their own constraints, based on their interest, that will define appropriate practices, albeit within the bounds of the organizational context and the already defined organizational interest. In the case of AMI, it could be argued that uncertainty regarding practice patterns is low, given the consistent weight of efficacy evidence derived from the large number and robust design of

clinical trials of drugs to treat AMI, as well as the great number of pathophysiologic studies and published consensus guidelines on the subject. However, there are still unknown elements in the treatment of AMI as well as the potential for mimetic influences in, heretofore, unexamined areas of AMI treatment.

One might argue that the most likely mechanism of isomorphism at play is the normative pressure to conform, since the normative influences appear to be somewhat more straightforward, although the direction and levels of influence are complex and may involve feed-back loops which influence the level of institutionalization. Normative isomorphism stems from professionalism. Two aspects of professionalism, according to DiMaggio and Powell (1983), are critical sources for isomorphism. The first is the "resting of formal education and of legitimation in a cognitive base produced by university specialists" (152). The existence of centralized training results in the development of organizational norms. Second, the existence of professional organizations that cut across specific and sub-specific organizations provides a vehicle for information to be disseminated. These traits provide the context within which the definition and delivery of behavioural norms takes place. In the medical profession, then, the professional project is highly organized and extremely pervasive through all levels of medical training and practice, so one would expect there would be normative influences at work.

However, as has been recognized by Mizruchi and Fein (1999) and was also explained by DiMaggio and Powell (1983), the three types of isomorphic mechanisms may not be as distinct in practice, or upon empirical investigation, as they are set out in theory. This suggests that, while an analysis that includes the potential for the existence of all three mechanisms will ultimately improve the understanding of the process of institutionalization, it will not necessarily be as clean and straightforward as the framework which allows the investigation to proceed puts forth.

This study proposes to use three principal suppositions from institutional theory. First is the general idea that institutional theory can assist in explaining the homogeneity among organizational practices. An important concept is that of an organizational field. An organizational field, as defined by DiMaggio and Powell (1983) is "those organizations that, in the aggregate, constitute a recognized area of institutional life: key suppliers, resource and product consumers, regulatory agencies, and other organizations that produce similar services or products (148). The health care sector or field constitutes one type of organizational field with constituents ranging from, but not limited to, hospitals, community health care centres, clinics, individual and group practices, patients, governments, health care workers including physicians, nurses, regulatory bodies, and a variety of professional associations and educational bodies as well as regulatory bodies.

Second is the notion of isomorphism. As DiMaggio and Powell (1993) have described, there are three mechanisms of isomorphism that may be at play in the generation and maintenance of the practice pattern differences in the treatment of AMI. It is imperative to be able to identify and describe such mechanisms in order to understand how such practices are generated, what mechanisms allow their persistence and, thus, what potential, if any, there is for change.

Third, combined with isomorphism, is an important assumption about the processes of institutionalization, for the potential or mechanisms for change, may hinge on the identification of the stage of institutionalization of a specific structure or process. In the case of the practice patterns identified, it appears that there are several aspects that contribute to what has been defined as a practice pattern for treating AMI. However, examination of the change in practice patterns when an intervention in the form of a critical path is introduced, leads to the conclusion that there are in fact several 'practice patterns' being utilized in this treatment pattern.

This is a two-phase study designed to answer the research questions through the framework of institutional theory. The first phase collected and presents data to illustrate that the phenomena of interest exist in a wide range of physicians treating AMI's, which suggests that the processes of isomorphism cross organizational and geographical boundaries, and are able to influence large and distal groups. The second phase of the study allowed an examination

of which mechanisms are responsible for practice pattern conformity and the practice pattern differences and how these mechanisms manifest themselves in practice patterns through the organizational environment to allow the homogeneity of treatment to continue. This research then, identifies the processes and isomorphic mechanisms of institutionalization of the treatment and prescribing patterns of AMI, through the use of the research design described in the following chapter. It is important to recognize that this research deals with practice patterns and the homogeneity of practice patterns within an institution. The institutional theory literature begins from the premise that organizational systems and structures are similar due to the mechanisms of isomorphism. However, there are other research examples that investigate the homogeneity of organizational practices and policies, such as Montgomery and Oliver's (1996) investigation of responses by professional organizations to the AIDS crisis, Levitt and Nass's (1989) study of decision-making in the technical core of college-text publishers, and Goodrick and Salancik's (1996) investigation of cesarean births.

Chapter 4: Methodology

The research utilized a two-phase research design. Phase one of the study was a multiple-province physician survey questionnaire (Appendix A) designed to define contemporary management patterns for patients with heart attacks and, in particular, to confirm the existence of the practice patterns bias among a wide range of physician groups, including cardiologists, internists and general practitioners.

The second phase of the research used in-depth interviews with a smaller physician sub-sample. These interviews have been analyzed to illustrate and define the normative, and other, mechanisms of isomorphism which contribute to these particular practice pattern biases and to identify the stage of institutionalization. This information may influence the patterns of practice in other specialties and diseases as well.

Phase two of the study was undertaken irrespective of whether or not phase one identified a practice pattern bias. The need for phase two is obvious if a bias was found. The absence of bias in self-reported practice pattern surveys, in light of the audit data for AMI and other diseases that describes such a bias, would, however, suggest that phase two provides an important vehicle to illuminate the mechanisms that establish and maintain the practice patterns that play out in

play out in clinical practice, but to which physicians themselves are unaware in their actual practice patterns compared to self-reported practice patterns.

Phase One

Research and Questionnaire Design

The initial step in the study was the development of a case scenario to be used in both phases of the study. As previously suggested, physician knowledge of appropriate or evidence-based treatment patterns may not be reflected in actual treatment patterns. This may mean that there are, perhaps, multiple levels of institutional processes at work of which physicians are unaware, but which have a serious impact on practice patterns and the ability to change those practice patterns. As previously discussed, physicians' knowledge and understanding of appropriate practice patterns may not equate to altering practice pattern behaviour to reflect this knowledge. The importance of a realistic patient case then, cannot be overly emphasized in attempting to define contemporary AMI practice patterns. Otherwise, the isomorphic mechanisms will not likely come into play in the decision making process for treatment options.

The hypothetical case was developed using information gathered from patient files and with the assistance of five experienced cardiologists. It includes all relevant clinical information that the physician would need to make a risk assessment or treatment decision, as well as attempting to set the context for the physician. However, it is anticipated that context, in the strictest sense, does not

have as strong an influence on physician behaviour in this scenario as it may in other types of decision making processes. This is due to several factors. Physicians often make treatment decisions, and treatment changes, based on case notes or verbal reports from other health care professionals, similar to what is presented in this case scenario. As well, the actual time frame that the physician might see the patient is relatively short, usually in the order of minutes, limiting the impact of many of the contextual aspects that are likely present in other decision processes. Additionally, physicians are comfortable with, and frequently engage in discussions of best practices for particular types of treatments, and also construct and answer hypothetical case questions for students and interns. What is important in terms of context is that physicians will carry with them their own images of how they treat patients, the setting, their organization, and so on, which will be transposed to their response to the hypothetical case.

Four additional clinical cardiologists were asked to preview the case and provide suggestions to ensure that the case is realistic, understandable, non-ambiguous and likely to elicit the treatment and prescribing information being sought. Four hypothetical cases in total have been generated, with the only differences among the four being sex and age of the patient in each scenario. Case A is a male less than 70 years of age, Case B a male older than 70 years of age, Case C a female less than 70 years of age, and Case D a female older than 70 years of age. The initial phase of this study consisted of a self-administered, mailed

questionnaire (Appendix A). The purpose of this phase of the study was to broaden the sample of respondents in order to be able to potentially generalize the findings, while illustrating the presence (or absence) of the age and/or sex treatment and prescribing differences. The advantage of a mailed, self-administered questionnaire for these purposes is clear; a large sample of respondents can be reached relatively economically. It is this potentially large number of data points that make a mail survey essential in order to present credible results to the medical community. Any other survey method makes reaching the large sample size prohibitively expensive.

The questionnaire consists of four major parts. The first is an attachment which introduces the subject and rationale for the questionnaire. Each letter was signed by the principal investigator in each province, as well as one other prominent individual. Additionally, a cover letter signed by the presidents of the Canadian Cardiovascular Society and the Canadian Society of Internal Medicine prefaced the letter of introduction and the questionnaire. The intent of this letter was to promote the importance and value of the questionnaire to the respondents, in hopes of increasing the response rate. These letters may be examined in Appendix A. The second part consists of the case scenario, and includes all the necessary information to enable the physician to make decisions regarding the management of this hypothetical patient. The third portion of the questionnaire consists of questions directed toward understanding what patient management choices the physician would make, and what factors or elements

the physician utilized to make those choices. It was hoped, from the scale utilized for these questions, and the response provided, to determine the weights the physician might attach to these individual factors for each patient management choice. The scales have been chosen in order to gather the best information from the physician without forcing them to utilize a dichotomous scale, thus limiting either the response rate to particular questions, or the opportunity for the physician to weight some factors more heavily than others. The particular factors contained in the questionnaire were drawn from information gathered in consultation with practicing cardiologists. In order to reduce any potential bias that may occur while a respondent is completing the questionnaire, five versions of the questionnaire were printed, varying the order of the management choices. This reduces the potential effects of a response bias that could occur if respondents were able to identify, while completing the questionnaire, exactly what the researcher is attempting to illustrate, and thus alter their response during the completion of the questionnaire.

The manipulation of the age and sex variables would likely be transparent to the respondents if all four case studies were given to each respondent. Therefore, each respondent received only one of the four variations of the case scenario in an equal randomized distribution, stratified by physician specialty.

The final portion of the questionnaire requests demographic data from the respondents. This information has been used to determine if there are any

identifiable practice patterns associated with the physician demographic variables. For example, this analysis is able to determine whether older physicians are more or less likely to exhibit differences based on patient sex when managing heart attack patients. However, this is not a key aspect of the research at this time.

The questionnaire was pre-tested at the University of Alberta Hospitals. A resident-in-training sample was chosen to pre-test the questionnaire for two important reasons. These individuals have an education and experience level that facilitates testing the language and case scenarios that have been used in the questionnaire. Also, a pre-test using the actual sample population of general practitioners, internists and cardiologists would decrease the remaining sample available for the survey administration in Alberta. In pre-test, two sets of questionnaires were sent to a total of ten potential respondents with a 14 day waiting period between the first and second administration. The pre-test resulted in a total of 18 questionnaires (9 respondents) being received. The results of this pre-test were clear. No correlation coefficient or Cohen's Kappa's were calculated for this data as it is necessary to have a 2X2 or 3X3 table to accomplish this and this data were not appropriate to complete such an analysis. A visual inspection of the results indicates that there is a reasonably high correlation between the first administration and the second. The respondents were given an opportunity to provide comments about the survey. No comments resulted in changes to the survey.

Sampling Frame

Several medical professional organizations, including the provincial medical associations, provided assistance for the administration of the questionnaire. These bodies provided an up-to-date list of the practicing cardiologists, internists and general practitioners in the provinces included in the survey administration, along with their most recent mailing address, which were used as the sampling frame. These three specialists are the appropriate groups to include in the survey and interview phases as they are the most likely physicians to be treating AMI's. Cardiologists are specialists in medically treating all types of heart diseases and conditions. In urban settings it is this specialty that will either be directly treating AMI patients or will be involved in the consultation, thus providing input into decision-making for the treatment of such a patient. In smaller centres and rural areas, it is more likely that a general internist, physicians that treat a variety of internal medicine problems or disease states, or a general practitioner would be treating AMI patients. General practitioners in smaller centres and rural areas are relied upon to provide care in emergency settings as specialists are not usually available in these areas. It is unlikely that any other major specialty physician group would be treating this patient population on a regular basis, thus the questionnaire and interview phases included only physicians that were identified as belonging to one of these groups.

In Alberta, the Continuing Medical Education division of the Faculty of Medicine, University of Alberta, provided the sample. In British Columbia, Ontario and Nova Scotia, the provincial College of Physicians and Surgeons provided the sample and in Quebec the College des Médécins du Quebec provided the physician information.

Each practicing physician in any province in Canada must be licensed to practice in that province by the government appointed licensing authority. These licensing authorities, the College of Physicians and Surgeons, maintain lists of practitioners by practice specialty and these data provided the information necessary to develop the target respondent population and its stratifications. There existed the potential for overlap between general internists and cardiologists. However, efforts were made to reduce this overlap through consultation with the appropriate bodies in that province.

The sample frame is relatively comprehensive in that the names provided by the provincial and federal licensing bodies are updated on a yearly basis when each physician renews his or her license to practice, and additions and deletions are entered in a timely manner, since the physician is unable to practice until the license has been granted. The sample frame missed some individuals that had recently changed their place of practice, as their changes of address were unavailable. This was a relatively small number, since movement of physicians between provinces has been restricted, or discouraged, in recent years.

Finally, the sampling frame included respondents that received the questionnaire but were unable to complete it because they had not treated a heart attack patient in the last 12 months. This potentially decreases the efficiency of the sampling frame. Alternative selection processes for the respondent group to eliminate this inefficiency are not as cost-effective or feasible as the preceding method. In Alberta and British Columbia, it was anticipated that in urban centres the majority of general practitioners do not treat AMI patients due to the ready availability of specialists, tertiary care hospitals and specialized outpatient cardiac clinics. Thus, sampling of general practitioners in these two provinces focused on the rural areas where patients experiencing AMI are treated by general practitioners. Since the survey was attempting to define current practice patterns, it was expedient to include in the sampling frame only those physicians that were able to provide the information sought.

In consultation with the investigators in Ontario, Quebec and Nova Scotia it was deemed to be too time intensive to follow this same procedure for the selection of general practitioners. As well, there are many smaller, urban areas in which general practitioners may, in fact, treat AMI. For these reasons, all general practitioners were included in the sampling frame in these provinces.

Target Population Sample Size and Selection

Before any sample data were received, estimates of statistical power were made for each of the three physician categories based on approximate numbers of physicians in each category. Rates of beta-blocker medication utilization were used for these estimates. Assuming a true population proportion of 55 percent, and the ability to detect a five percent difference in utilization, the number of general physicians sampled (n=5685) will have power greater than 95 percent, even if the response rate is as low as 35 percent. For the 700 cardiologists, the corresponding power will be 64 percent for a 75 percent response rate, and 52 percent for a 50 percent response rate. Similarly, the power for the 1200 internists will be 86 percent for a 75 percent response rate, and 70 percent for a 50 percent response rate. Although a difference of more than five percent are expected, it is important to obtain a good response rate, particularly from the specialists.

There were 739 practicing cardiologists in the five provinces. Because this was a major target population needed to answer the research questions, questionnaires were mailed to all practicing cardiologists in the provinces that took part in the survey.

The internists sample was based on density in each province. There were a total of 2225 questionnaires mailed out with the following distribution in the five

participating provinces: 374 in Alberta, 376 in British Columbia, 64 in Nova Scotia, 1048 in Ontario and 363 in Quebec. A stratified sample of 50 percent of the total was chosen, based on the number of internists in each of the participating provinces.

The general practitioner sample was chosen again based on the distribution of physicians in each participating province, with a 50 percent random sample being chosen (1040 in Alberta, 1639 in British Columbia, 422 in Nova Scotia, 5147 in Ontario and 3306 in Quebec, 3521 in French and 472 in English). No attempt was made to identify and choose equal proportions of physicians with respect to age, sex or any other demographic variable.

The target population, again, was those physicians that had treated a heart attack patient within the last 12 months prior to receiving the survey. This was to ensure that respondents were able to utilize the hypothetical case as a 'real' patient that they could visualize in their current treatment setting which would enable them to apply their standard patterns of care to the case. As suggested in Chapter 2, physicians may have a good understanding of the theoretical treatment of specific diseases, however, it is not the theoretical knowledge that is under scrutiny in this study, but rather how that knowledge is translated into actual treatment behaviours. It is essential, then, that respondents actually treat this patient population in reality, not just be able to in theory.

A total of 14518 questionnaires were mailed to the three categories of physicians in Alberta, British Columbia, Nova Scotia, Ontario and Quebec (Table 1).

Table 1: Survey Administration – Number of Surveys Mailed

	AB	BC	NS	ON	QC	ALL
Cardiologists	57	67	24	267	324	739
Internists	374	376	64	1048	363	2225
GPs	1040	1639	422	5147	3306	11554
Total Mailed	**1471**	**2082**	**510**	**6462**	**3993**	**14518**

Timing of Questionnaire Mail-Out

The first batch of questionnaires were mailed to Alberta physicians, and was used to closely monitor the administration process in order to identify and correct any logistic problems regarding survey administration. The content of the questionnaire was in no way altered in subsequent mail-outs. The timing of the survey mailings may be examined in Table 2.

Table 2: Survey Administration–Dates of Survey Administration and Responses

Province	1st Mailout	1st Reminder	2nd Mailout	2nd Reminder	1st Response	Last Response
AB	06-Jun-97	03-Jul-97	15-Aug-97	09-Sep-97	17-Jun-97	06-Nov-97
BC	30-Jun-97	21-Jul-97	24-Sep-97	15-Oct-97	06-Jul-97	21-Apr-98
ON	20-28-Oct-97	27-Nov-97	17-24-Feb-97	30-Mar-97	13-Nov-97	23-Jul-98
NS	13-Nov-97	19-Jan-98	26-Mar-98	27-Apr-98	25-Nov-97	02-Jun-98
QC	02-Dec-97	21-Jan-98	19-23-Mar-98	27-Apr-98	16-Dec-97	28-Jul-98

Reducing Non-Response

Every attempt was made to obtain an adequate response rate. While response rates cannot be accurately predicted, several previous mailed questionnaire surveys of medical personnel obtained response rates in the range of 48 percent to 71 percent (Campbell and Waters, 1990; Shiono and Klebanoff, 1991). As suggested by Fowler (1993) the questionnaire was professionally typeset, with a letter of purpose and a self-addressed, stamped return envelope attached. The questionnaire was attractively presented, with clearly written instructions, an uncluttered design and ease of response.

A three-stage administration procedure was followed as described by Creswell (1994) and Fowler (1993). An initial mailing was completed, followed by a reminder postcard approximately two weeks after the initial mailing, followed by

a third mailing of the complete questionnaire approximately six weeks after the initial mailing. Each questionnaire and return envelope was marked with a numerical identifier, matching the questionnaire with the physician respondent. This was done to reduce, as much as possible, the cost of mailing reminder postcards and additional questionnaires to early respondents. As the questionnaire has a numerical identifier and will not be anonymous it was possible to re-mail the complete survey instrument only to those physicians that had not returned the completed questionnaire. According to Campbell and Waters (1990), anonymity does not increase response rate in postal questionnaire surveys dealing with sensitive subjects, however, the use of reminders may do so. Physicians were advised, in a letter stating the purpose of the survey, what the identifier is for, and that at no time will individual questionnaire responses be connected to individual physicians.

Data Analysis

The Epidemiology Coordinating Research (EPICORE) Centre of the Division of Cardiology, University of Alberta, was the coordinating centre for data collection, collation and quality assurance for this study. All data was entered into a database. Each province was given the opportunity to obtain its own data. Data was entered and analyzed using the software SPSS for Windows (Version 7.5), with accuracy checks being completed by EPICORE staff at various points during the data entry period.

To investigate the possible age and sex differences in the treatment of acute myocardial infarction, the likelihood of using a specific treatment was regarded as the dependent variable, and the factors influencing the prescribing decision as the independent variables. Since the dependent variables are categorical in nature, to be coded from one to five on an ordinal Likert-type scale, non-parametric methods such as chi-square tests and Kruskal-Wallis analysis of variance procedures were used to test the age and sex differences in treatment decisions regarding acute myocardial infarction. Through such analyses, it was possible to identify factors that significantly influence treatment decisions across geographic regions, specialties and other physician characteristics. By further investigating the significance of interactions between age and sex on the one hand and, for example, practice and geographical factors on the other hand, issues such as a possible gender variation by type of practice or geographic region were also investigated.

Data was analyzed for response bias using a wave procedure described by Creswell (1994). The completed questionnaires were coded as they were received with the week in which they were received, beginning with week one through week eight. The number of surveys returned subsequent to week eight was significantly lower, therefore, the potential for response bias was tested for the initial eight weeks. The mean responses for the use of each drug were determined for each week, which indicated the absence of a response bias.

Response Rates

A total of 14,518 questionnaires were mailed out in the five participating provinces. The overall response rate averaged 36 percent, with the highest response rate from Alberta at 44 percent, followed by 37 percent in Nova Scotia and Ontario, 36 percent in British Columbia and 31 percent in Quebec.

Table 3: Survey Administration – Response Rates by Province

	AB	BC	NS	ON	QC	ALL
Total Mailed	1471	2082	510	3462	3993	14518
Category A Respondents	74	63	16	290	115	556
Category B Respondents	258	311	89	1258	639	2557
Category C Respondents	318	373	85	872	488	2136
Total Respondents	650	747	190	2420	1242	5249
Response Rate (%)	**44**	**36**	**37**	**37**	**31**	**36**

NB:
Category A refers to respondents that do not treat AMI's and did not complete the demographic information.
Category B refers to respondents that do not treat AMI's and completed the demographic information.
Category C refers to respondents that do treat AMI's and completed the demographic information.

Three categories of respondents emerged from the mail-out questionnaire. Category A can be described as those respondents that did not meet the criteria to complete the questionnaire, that is, they did not treat an AMI patient in the preceding 12 months, and did not complete the demographic information as they were requested to do. Category B respondents also did not meet the criteria for questionnaire completion, but did complete the demographic information. Category C respondents were those individuals that met the criteria for questionnaire completion and filled out the survey. A further breakdown of these respondents by province is illustrated in Table 4.

Table 4: Questionnaire Results: Respondents by Province and Specialty

	AB		BC		NS		ON		QC		ALL	
	Mailed	Rec'd	Mailed	Rec'd	Mailed	Rec'd	Mailed	Rec'd	Mailed	Rec'd	Mailed	Rec'd
Card.	57	36	67	38	24	20	267	162	324	96	739	356
Intern.	374	75	376	56	64	21	1048	165	363	55	2225	372
GPs	1040	324	1639	429	422	105	5147	1369	3306	801	11554	3028
Other*		135		156		28		418		170		907
N/A		6		5				16		5		32
Don't Treat		74		63		16		290		115		558
TOTAL	1471	650	2082	747	510	190	6462	2420	3993	1242	14518	5249

- No questionnaires were mailed to a category "Other", however in returned questionnaires, some respondents chose this category

Perhaps a more realistic measurement of the response rate would disregard those responses in Categories A and B (those that do not treat AMI's) thus an adjusted response rate would be 5249 respondents from a potential pool of those who might treat AMI's of 11405. The revised response rate is calculated to be 46%, which is more reflective of the respondent population of interest. As well, it is to be recognized that specialist response rates will vary considerably due to the geographical location of specialists versus generalists and where the greatest population of AMI patients reside and are treated. Cardiologists are located in large, urban centres and are especially prevalent in centres in which teaching hospitals are located and would be the largest portion of the physician population treating AMI patients because of their sub-specialty. It is to be remembered that surveys were sent to 100% of the active cardiologists in the five target provinces. Thus, the average cardiologist response rate of 48% is adequately representative of this specialty treating this patient population. Internists, except in special circumstances, most particularly older, more experienced respondents, are less likely to be treating this patient population in

large, urban centres where cardiologists are avaiable. The internist who treats AMI cases would likely be found in a smaller, urban centre, with a large enough population to support such a specialist. However, this patient population would represent only a small proportion of their practice. General practitioners treating AMI's will be found in small, rural situations where this specialty is found taking call at the local hospital and is usually practicing without the in-person support of cardiologists or internists. Again, this patient population would represent a minor fraction of the total patient population that a general practitioner would treat. Thus, it is recognized that cardiologists should represent the greatest relative proportion of respondents given the distribution of the patient population and physicians. Of concern in any self-administered questionnaire is the possibility of response bias. In this case, perhaps the most obvious bias is that physicians with strong feelings regarding the subject matter, and perhaps more knowledge, might be more likely to respond than the average practitioner and, consequently, the weight of the sample opinion might favor the outspoken physician sector. On the other hand, all responses are valid, given that all respondents met the criteria for inclusion. And the aggregate level data certainly define an average practice pattern for AMI for the total physician sample, which, by virtue of the relatively large sample size, can be reliably expected to have produced an acceptable standard error of the mean. That is the mean of the sample population is probably acceptably close to the mean of the whole practicing physician population. Nonetheless, as suggested above, the results may be skewed to reflect better than average practice patterns if concerned and

knowledgeable physicians are over-represented. This suggests that physician evidence-based decision-making for the treatment of acute myocardial infarction is, on average, worse than what the questionnaire results would indicate. This would likely translate into greater age and sex differences in prescribing patterns than are indicated in the following results, or have been found in repeated practice audits. Given these factors and unique aspects of the sample population, the survey response is representative of the physician population of interest.

There were twelve versions of the questionnaire mailed to potential respondents: four cases in three sequences of the questions posed. This allowed any order bias to be observed. Each version, one through twelve, was randomly assigned in each province to an equal number of potential respondents. Table 5 illustrates the frequency of actual respondents for each of the twelve versions. As expected, randomization produced an equal percentage of respondents for each version, with a high of 8.6% for Case A, Sequence 2 and a low of 8.1% for Case C, Sequence 1.

Table 5: Questionnaire Results: Response by Version

CASE TYPE*	FREQUENCY	PERCENT
Case A Sequence 1	449	8.6
Case A Sequence 2	449	8.6
Case A Sequence 3	423	8.1
Case B Sequence 1	450	8.6
Case B Sequence 2	440	8.4
Case B Sequence 3	446	8.5
Case C Sequence 1	425	8.1
Case C Sequence 2	433	8.3
Case C Sequence 3	430	8.2
Case D Sequence 1	441	8.4
Case D Sequence 2	432	8.2
Case D Sequence 3	428	8.2
Missing ID	3	
TOTAL	5249	100

Case Type*
Case A – 54 Year Old Male
Case B – 76 Year Old Male
Case C – 54 Year Old Female
Case D – 76 Year Old Female

An analysis was completed to test for potential question order bias. A separate analysis of the respondent characteristics was undertaken to evaluate the possibility that differences due to question order may be attributable to differences in physician characteristics rather than solely to order of the questions. The analyses illustrated that there were, in fact, no significant differences between the respondents for the twelve questionnaire versions.

Subsequent analysis revealed in a significant difference for two of the treatments. The first was for aspirin. Upon closer examination of the data, it appears that for sequence 3, which placed aspirin as the first treatment question, there may have been some confusion regarding the scale. It seems

improbable that solely in this group of respondents (i.e. sequence 3 questionnaires) that a disproportionate number of physicians would be very unlikely or unlikely to utilize aspirin. Upon closer examination, four of the answers were incorrectly entered.

The other noticeable difference was in terms of the exercise stress test. Here, the difference was found in the very unlikely or unlikely to utilize response portion of the analysis. For sequence 1, 43% or the respondents answered in this category, 25% in sequence 2, and 32% in sequence 3. This appears to be the play of chance as there is not a consistent order bias in the other treatment questions, and this question was not at the beginning or end of the survey. This question was second to the last question in this portion of the survey, which may have had some impact, however, it would appear that it might have more to do with the uncertainty of the usefulness of this particular test than the presence of order bias in the questionnaire. This may be seen in the distribution of the responses over all five possible answers, with the majority in the third, fourth, and fifth categories. Categories 1 and 2 have a relatively smaller frequency of responses, and therefore the apparent significant difference may well be due to the lower frequency in this category.

Phase Two

Research and Survey Design

Phase two of this investigation utilized a verbal protocol analysis. A verbal protocol is a tool that enables the researcher to gather questionnaire data as the respondent is answering the survey questions. It was important in this phase of the study to attempt to elicit the reasoning for decision making from the respondents. This is not possible with respondent answered questionnaires. It is therefore necessary to utilize a verbal protocol that is designed to not only elicit questionnaire responses, but to also probe the respondent for the decision making process that is occurring at the time of the questionnaire completion.

Bradley (1991) suggests that verbal protocols have been successfully utilized for diagnostic and therapeutic decision making. Klersey and Mock (1989) similarly conclude, from a review of the use of verbal protocol analysis in auditing research, that verbal protocols provide a "richness of detail" with respect to judgment and decision making, and even given some of the concerns regarding the use of verbal protocols, they are a useful tool, and are able to provide important insights into the decision making process. It is anticipated then, that such an investigation will provide information that is necessary to understand the age and sex bias apparent in the treatment of heart attack patients. Verbal protocol analysis was chosen for this study as, according to Payne et al (1978), "the input-output analyses that have been used in most decision research are

not fully adequate to develop and test process models of decision behavior" (19). That is, most investigations collect data that reflect only the result of the decision process, not the processes that lead to that particular result. The authors argue that it is necessary to focus on pre-decision behaviour or processes in order to more fully understand, and collect data about, the psychological processes that result in a particular decision.

A verbal protocol, then, is one method by which data about pre-decisional behaviour can be collected. Respondents are asked to give continuous verbal reports, or think aloud, while performing the prescribing decisions based on the case scenario. Each 'interview' or verbal protocol was be tape recorded and transcribed for later analysis.

There are several important assumptions regarding verbal protocols that had to be heeded. First, respondents have to be unaware of the theoretical constructs that are of interest to the investigator (Payne et al, 1978). In this case, as the manipulation of the factors of sex and age was transparent, each respondent will have received only one variation of the case to review.

A second assumption is that individuals completing the protocol have access to their mental operation. That is, that each step occurs sequentially, and each step is available long enough in short term memory to be reported (Stevenson et al, 1990). This is an especially important assumption as it is one of the major reasons that verbal protocols are utilized in decision making research. As previously suggested, it is during the actual decision making process that

individuals, particularly experts, are able to tap into the long term, or subconscious, memory, where it is assumed much of the information used in decision making originates. This information is stored briefly in the short-term memory as it is used.

Thirdly, verbal protocols assume that the respondent is willing and able to accurately verbalize the events that are occurring during the decision-making (Stevenson et al, 1990). While this assumption is, for the most part, not testable, it is nevertheless possible for decision makers to be able to articulate, while the process is occurring, what they are thinking and the factors that are influencing the decision making.

A fourth assumption is that the task of verbally reporting the decision making events does not interfere with, or alter, the actual decision making process (Stevenson et al, 1990). Ericsson and Simon (1980) concluded, from an extensive literature review, that verbal protocols should not change the course of the decision making process or the structure of the process, as long as the respondents are not asked to report on any stimuli or processes outside of the decision being verbalized. Schweiger (1983) conducted a study to assess the impact of the simultaneous verbal protocol on the decision-making performance for a complex managerial task. The author concluded that the use of the simultaneous verbal protocol did not affect the performance of the decision making task. Anderson (1985), however, found that the act of articulating during the decision making process may alter the process "under certain

conditions"(850). But, the author found that it was less experienced individuals that encountered a decline in performance when they were asked to verbalize during the decision making process, while with the more experienced individuals, verbalization during the decision making process did not change the performance. In the current study, the respondents were familiar with the task and the problem, so the expectation was that the act of verbalization during the decision making process had no impact on the process.

Finally, the use of verbal protocol assumes that the actual rate of reporting thoughts during the process is high enough that the actual thought process can be reconstructed or is represented (Stevenson et al, 1990). Several studies, in numerous disciplines, have utilized verbal protocols with success. For example, Isenberg (1986) was successful in using verbal protocols to understand the cognitive processes that managers use in understanding and solving business problems.

Verbal protocol analysis appears to be an essential tool in gaining insights into patient management decision behaviour of physicians. The interview, and verbal protocol analysis, was semi-structured, in that the physicians were instructed only to think aloud during the review of the case, that is to verbalize their line of reasoning during the interview. The same questionnaire was utilized to initiate the interviews, however, as expected, as the interviews progressed, lessons learned with experience prompted some minor changes in the structure of the interview over time. Questions were designed to explore physicians'

attitudes and understandings of what types of influences they perceived shaped their practice patterns which could be then be interpreted utilizing the institutional theory lens. Returning to institutional theory, such influences were expected to include coercive, mimetic and normative mechanisms. These have been included in the interview in the form of open-ended questions that cover anticipated mechanisms in a very general sense. As this research was at an exploratory level, predetermined categories or mechanisms were innappropriate. The questions were designed to promote open discussion that would allow for these mechanisms to emerge from the data during analysis. However, initial themes were recognized from the literature review regarding practice patterns as well as from the results of the questionnaire in terms of the factors influencing treatment decisions. For example, because the current literature emerged from the questionnaire results as a strong influence on treatment decisions for the AMI patient cases, probing respondents during the interviews about the literature that they referred to was an important aspect of the process. Generally, coercive mechanisms were envisioned to include hospital or practice policies, the use of guidelines and any other types of policies that inhibit or prescribe how physicians treat a specific disease once diagnosed. This may also include prescribed maintenance of competence activities (MOCOMP) that each physician is required to undertake to maintain their license. Mimetic mechanisms were expected to be identified via various types of physicians' activities particularly delineated by specialty, and were anticipated to be present in the formal education and training phases in which physicians take part where

repetition and 'copying' instructors and role models would be prevalent and, potentially, continuing medical education activities. Here also, guidelines could be construed as mimetic devises that shape practice patterns. Finally, normative mechanisms were expected to be present in all phases of physicians' training, education, and practice. These could be particularly associated with professional activities that included participation in training and education, general and specialty professional associations, interactions with colleagues and peers, as well as consultations with other specialists. The four open-ended questions were designed to cover each of these areas, with additional prompts where necessary, in a manner that would allow the presence for the three types of mechanisms to be defined in the data analysis. This format was successful in eliciting the type of information required to allow interpretation and identification of the mechanisms which influence practice patterns. The interviews lasted 45 minutes on average.

Sample

In order to balance the need to obtain data from a representative sample of physicians with the time and cost of collecting this data, 53 verbal protocols were collected by having 53 experienced, practicing physicians review the case scenario in the taped interviews. This sample consisted of nine cardiologists, seven general internists, eleven general practitioners, and five emergency physicians. As suggested by Miles and Huberman (1994), the collection of multiple cases in order to proceed with a cross-case analysis was important for

this study to "deepen understanding and explanation"(173). The interviews were geographically dispersed, based on a random sampling method, to provide the best possible information, and to decrease the risk of introducing geographical or small area variation.

Physicians were chosen from the same sampling frame in the first phase of the study, introducing the potential for any particular physician in the target population to be chosen to complete the questionnaire and to participate in the interview. The physicians were contacted, with the assistance of local opinion leaders, to garner their commitment to participating in the study and to arrange a convenient time for the interviews to take place. Information was gathered regarding each physician selected, including those that declined to participate, and reasons for refusal to participate were documented, where possible. Participating physicians were assured of confidentiality of the interview process and responses provided. No participant is identified by name or location. No single interview is identified in its entirety, although selected phrases are utilized to provide clarity to the analysis and documentation of the findings.

Interviews were completed in Alberta, British Columbia, Nova Scotia, Ontario and Quebec. In Alberta, 12 interviews were scheduled with 11 being completed. The final interview did not take place due to a last minute change in the participating physician's schedule. In British Columbia a total of 11 interviews were scheduled and completed. In Nova Scotia, 10 interviews were scheduled and completed. This total of 32 interviews collected were completed in person,

with the interviewer meeting with the interviewee. In Ontario and Quebec, 10 and 12 interviews were scheduled and completed, respectively. These 22 interviews were conducted by telephone, with the interview being taped by the interviewer. All interviews utilized the hypothetical case that includes the 76 year old female. This was an attempt to elicit unprompted during the verbal protocol comments regarding age and sex that might not have come to light if the other cases were utilized. By utilizing a hypothetical patient that was both female and elderly, respondents had the opportunity to include these parameters in their decision-making rationale, unassisted by prompts from the interviewer. Since it is the sex and age treatment differences that were of interest in this study, the use of a younger and male patient would likely not have elicited the details regarding treatment differences that were sought. The use of this age and sex of hypothetical patient was successful in obtaining decision-making information regarding the influence of age and sex on treatment decisions, in many instances without the necessity for prompts by the interviewer. This assists in identifying those issues or mechanisms, recognized by physicians themselves, that are relevant in treatment differences based on patient age or sex.

Data Analysis

All interviews were transcribed, verbatim. As this was a relatively exploratory phase, the exact format of the results was not set a priori. The data were coded initially using a provisional list of start codes, however, as expected, the codes

were refined and developed further as the data analysis continued, as is normal with this type of data analysis. Coding began with very general codes relating to the responses by physicians in the verbal protocol portion of the interview. Coding included references to the current literature, age, sex, and any other factor that influenced treatment decisions. Coding for the open-ended questions developed during the reading of the interviews. However, it began with initial, and broad level, codes such as influence of the literature, experience, opinion leaders, mentors, guidelines, clinical trials as well as perceptions regarding patient age and sex. These initial codes were then broadened, based on responses to the questions as the interviews were coded, to include multiple levels in these categories. The codes were not devised to relate specifically to, or be suggestive of, coercive, mimetic or normative isomorphic mechanisms. Coding began upon completion of the first 20 interviews and continued, with revisions, until completed. This was an iterative process that was refined with each subsequent interview and continued with continued processing of the data.

As this was the first attempt at eliciting this type of information from physicians, with respect to what influences patterns of practice, coding was based upon identifying reoccurring, single ideas in the interview data, rather than attempting to separate the data into discrete phrases, which would have lost the meaning of the ideas or perceived influence.

Fifteen percent of the interviews were coded independently by another individual. Reliability was found to be greater than ninety-percent. Those codes that differed or were missing were discussed and agreement was reached.

In summary, this approach allowed for the identification of treatment differences for AMI based on patient age and/or sex in a larger segment of the treating population of physicians, as well as some of the factors that influence such decision-making behaviours. The questionnaire results allowed for an appropriate focus for the interview phase by providing clues to how physicians think about treatment decisions, thus informing the types of open-ended questions that were asked to elicit helpful information. Through the use of the verbal protocol analysis, in conjunction with the open-ended questions, the interview phase provided greater insight into how physicians obtain treatment information and whether such information is actually incorporated into treatment decisions in usual care situations. The results are strengthened, of course, by the fact that the same physicians, representative of the whole body of the physicians that were surveyed, made up the verbal protocol analysis sample. In short, overall the results are strengthened by the fact that the sample used for the verbal protocol analysis was drawn from, and was very representative of the overall questionnaire sample. This research represents perhaps the first study in which the same respondents were surveyed for the large-scale questionnaire and for the verbal protocol analysis and in which the medical and organizational literatures were combined in a quantitative and qualitative approach to

investigate decision-making behaviour and the outcomes of such behaviour. The results of this two-phase, combined qualitative and quantitative approach are outlined in the following chapter and show an overwhelming consistency of trends in the results.

Chapter 5: Results

The results are examined in two segments. The first segment reports the existence of any significant demographic factors that influence the treatment differences that arise in the data. Although these are dependent variables in the analysis, it is an appropriate manner to begin, as this is the standard approach in the definition of any population sample, and can be important in outlining how the respondent demographics may relate to clinical risk assessment. It is also important to ensure that the sample is similar across geographical and specialist areas, particularly for the comparison of treatment patterns by specialist and province. Any major discrepancies in demographics must be explained before turning to other analyses that utilize these data. The second segment reports the results of the age and/or sex-based treatment differences for the AMI patients that provided the basis for the a priori concepts that marked the inception of this research.

Questionnaire Results

Demographic Data

Although the questionnaires were sent to the three physician groups identified previously, another group emerged out of the responses themselves that was allowed to respondents as 'Other'. Of 907 total respondents that categorized as 'Other', 163 were identified as emergency physicians. Other prevalent specialties included anesthesia (n=29), endrochinology (n=34), gastroenterology

(n=24), geriatrics (n=18), hematology (n=29), infectious disease (n=17), nephrology (n=27), occupational medicine (n=22), oncology (n=41), pediatric specialties (n=21), psychiatry (n=39), respirology (n=44), and rheumatology (n=37).

Demographic data for Category B and Category C respondents is illustrated by province in Table 6 and 8, respectively, and by specialty in Table 7 and 9, respectively in Appendix C.

Examining the data by province, mean age for respondents not treating AMI's is 49 for all respondents and ranges from an average of 46 years of age in Quebec to 51 years of age in British Columbia. Sex distribution ranged from 56 percent male in Nova Scotia and Quebec to 70 percent male in British Columbia, with an average of 62 percent male respondents. The vast majority of respondents were married or living with a partner. Of those respondents not treating AMI's, the majority are GP's, ranging from 50 to 77 percent. This is as expected since GP's would not likely treat AMI's except in smaller centres. The average number of years these respondents have been in practice is 20 years, and an average time in their current work situation of 13 years. There was very little variation in this characteristic.

The overwhelming majority of these respondents obtained their training in Canada, however there are some interesting differences in this demographic. In Alberta, 74 percent of the respondents completed the majority of their training in Canada, with 17 percent completing their training outside North America. This is

in contrast to Quebec, where 92 percent of the respondents trained in Canada, with only 3 percent receiving the majority of their training in the United States and 3 percent receiving their training outside North America

The majority of these respondents also spent most of their time engaged in clinical/patient care, with a range of 79 to 90 percent, and an average of 85 percent principally involved in patient care. In terms of the work setting, the majority worked in group practices (36 percent on average), followed by an average of 25 percent working in solo practices. As expected, a small minority of these respondents worked in areas that had on-site angiography, angioplasty or bypass facilities or had programs that had on-site cardiology, internal medicine or family practice trainees.

Most physicians are reimbursed by a fee for service schedule, as established by provincial government and Medical Association negotiations, with Quebec physicians being the least likely to be reimbursed in this manner. In the case of the specialties, GP's are most likely to be reimbursed by fee for service and internists least likely. The next largest method of reimbursement is salary, which is becoming more prevalent among younger physicians.

A very similar picture emerges when this data is examined by specialty.

In general, the data for category C respondents, those that do treat AMI's and completed the questionnaire, looks very similar to those that do not treat AMI's,

however, it may be more critical to highlight the few differences as these may influence patient treatment choices to some extent.

Mean age is slightly younger for this group of respondents, at 42 years of age, with little variation based on either province or specialty. There are however, some differences with respect to sex. Compared to the non-treating physicians, the percentage of males is higher with an average of 82 percent. This ranges from 74 percent in Quebec to 86 percent in Ontario; by specialty, 80 percent of GP respondents are male and 91 percent of cardiologists are male. The majority of respondents are, again, married or living with a partner, a mean of 87 percent. The next largest group is those individuals that are single, with few respondents divorced, separated or widowed.

Again, the majority of training takes place within Canada, an average of 86 percent of respondents with the majority of their training taking place in Canada. Other specialties were somewhat higher, at 86 percent with outside North America being the next highest group. In terms of provinces, Alberta has a somewhat lower percentage training in Canada, at 74 percent of respondents and 21 percent training outside North America. Quebec has the highest rate of training within the country at 95 percent, with the remaining split between the United States and outside North America.

The majority of work time is also spent doing clinical/patient care, with little variation. As might be expected for this group of respondents, the work setting looks significantly different than for those not treating AMI's. A higher

percentage of respondents are in a solo or group practice setting and have on-site angiography, angioplasty and bypass facilities as well as trainees on-site.

Reimbursement is again, largely by fee for service, with some differences based on province and specialty. Physicians in Alberta have a higher percentage reimbursed by fee for service at 92 percent, while Nova Scotia is the lowest at 67. Nova Scotia has 14 percent reimbursed by a practice plan and 11 percent by salary. Looking at the reimbursement by specialty, GP's have the highest proportion reimbursed by fee for service, while cardiologists and other specialties have the lowest reimbursement by this method. Thirteen percent of cardiologists are remunerated by a practice plan, while 12 percent of other specialists are on salary.

The average number of AMI's treated per month is 5 with slight variations based on specialty and province. While the average number of AMI patients treated per month in Quebec is 10, this is due to six respondents recording figures of 100 to 200 AMI patients treated per month. This may reflect data entry error, with the six perhaps having entered the average number of AMI patients treated per year. However the data was not altered to reflect this possibility.

Treatment Patterns

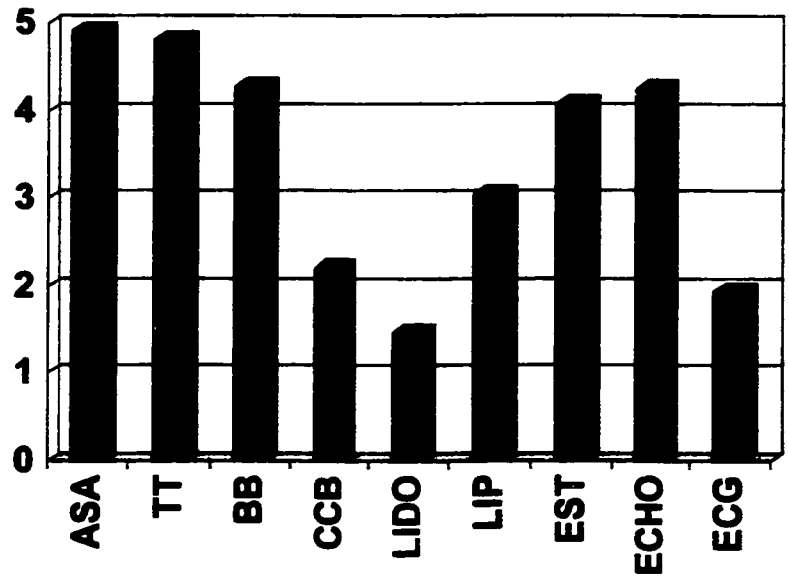
To begin the data analysis, the mean for the likelihood of utilization of each therapy or risk prediction test was determined (Table 10) and is presented in

Figure 4. Overall, the data suggest that aspirin (ASA), with a mean likelihood score of use of 4.92, is the most likely medical treatment to be used, followed closely by thrombolytic therapy (TT), with a mean of 4.82. This data suggests that in almost all cases, physicians would prescribe these drug therapies for the type of AMI patients represented in the hypothetical case. Beta blocker (BB) is also very likely to be used, with a mean prescription likelihood of 4.28. Calcium channel blocker (CCB) and lidocaine (LIDO) medications are unlikely to be used with mean likelihood for use of 2.21 and 1.56, respectively.

Requesting a serum lipid profile (LIP) within 24 hours has a mean score of 3.05, suggesting that 47 percent of respondents would request such a test, however, 53 percent of respondents are undecided or would not use this test. The mean likelihood of use for an exercise stress test (EST) is 4.08, again illustrating that the majority of respondents (76%) are likely or very likely to utilize this test as a method of post-AMI risk stratification. Likelihood of use of an echocardiogram (ECHO) to measure the heart's pumping ability, is 4.26, with 81% of respondents indicating that they would use this test. Finally, a small proportion of respondents believed that an ECG Holter monitor (ECG) was useful in this situation, with a mean of 1.94.

Figure 4: Mean Likelihood Scores for Use of Therapy and Risk Prediction for AMI

(1=Very Unlikely; 2=Unlikely; 4=Likely; 5= Very Likely)



Generally, for this particular patient circumstance, the evidence base strongly supports the prescription of aspirin, thrombolytic therapy, and beta blocker. However, the use of either calcium channel blocker or lidocaine is not commonly seen to be appropriate treatment, again based on the weight of the available clinical trials evidence.

In terms of risk prediction strategies, the contemporary evidence base is not quite so clear cut. Approximately 80 percent of survey respondents would utilize an echocardiogram, and 76 percent would use an exercise stress test. However, there is clearly confusion about the usefulness or appropriateness of a serum lipid profile in the first 24 hours of admission. And, only 12 percent of respondents believed that an ECG Holter monitor was useful in this situation,

suggesting that this test is not highly valued in the contemporary clinical management of this patient population.

Treatment Patterns by Province

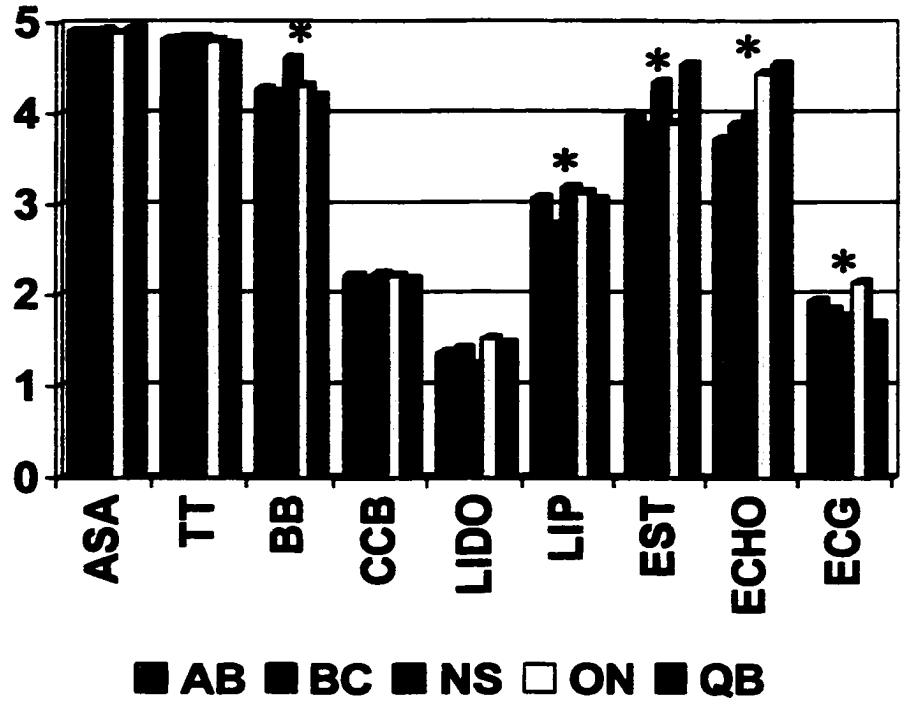
Examining the mean likelihood of use by province (Appendix C, Table 11) demonstrates some differences, particularly with the suggested utilization of beta blockers and all the risk prediction tests as illustrated in Figure 5 below. A subsequent analysis of these treatment patterns by province confirms that there were indeed significant differences between provinces for beta blocker use and for the utilization of risk prediction tests (Appendix C,Table 12). Examination of the means for likelihood of use and the percentage responding likely or very likely to use, it appears that for beta blockers, Nova Scotia physicians, with a mean of 4.62, are significantly more likely to use beta blockers than physicians in other provinces, at the 90% level.

The risk prediction test utilization was significantly different for all the tests, with the serum lipid profile being less likely to be used in British Columbia at a 95% confidence level, with a mean of 2.77. With the exercise stress test, the means ranged from 3.87 to 4.56, suggesting that there are significant differences within several of the provinces. The situation is similar for the echocardiogram, with means ranging from 3.37 to 4.56. This difference is significant at the 99% confidence level. The ECG Holter monitor is least likely to be used in Quebec,

with a mean of 1.69 and most likely to be utilized in Ontario, with a mean of 2.15. Again, these differences are significant at the 99% confidence level.

Figure 5: Mean Likelihood Scores for Use of Therapy and Risk Prediction for AMI, by Province

(1=Very Unlikely; 2=Unlikely; 4=Likely; 5= Very Likely)



* denotes significant difference in mean utilization at the 10% level or less

Treatment Patterns by Physician Specialty

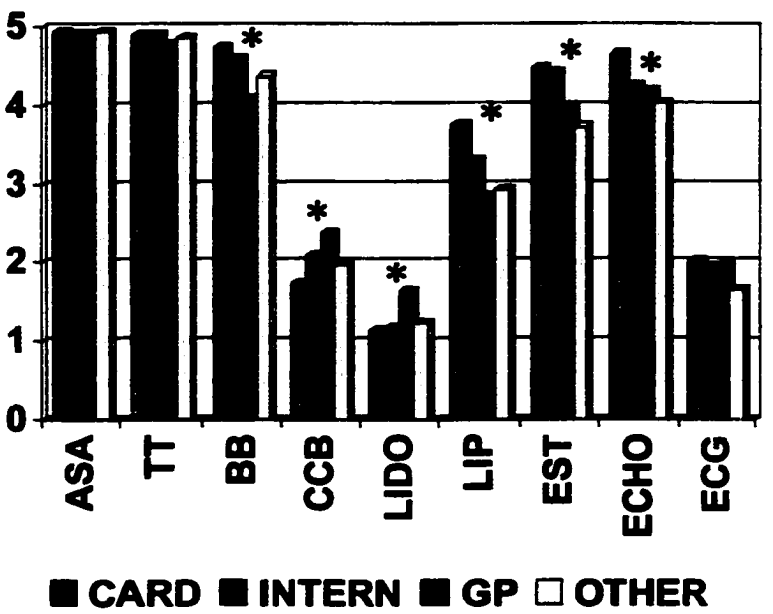
When the treatment patterns by specialty exhibited in Figure 6 are examined, more differences are apparent (Appendix C, Table 13 and Table 14). There were significant differences (at the 99% level) for beta blocker, calcium channel blocker and lidocaine use. Cardiologists and internists are more likely to prescribe beta blocker than GP's or other specialists. For calcium channel

blocker and lidocaine, cardiologists are less likely to prescribe this therapy than the other specialties, with GP's being the most likely to utilize these.

The results for risk prediction tests are very similar, with significant differences found (at the 99% level) for serum lipid measurements, exercise stress test and echocardiogram. Again, these patterns move from cardiologists being the most likely to utilize these tests, compared to internists, GP's, and other specialists who are, decrementally, less likely to use such tests. For the ECG Holter monitor, cardiologists are least likely to use this test as a risk prediction method, with the likelihood of use increasing for internists and again for GP's.

Figure 6: Mean Likelihood Scores for Use of Therapy and Risk Prediction for AMI, by Specialty

(1 = Very Unlikely; 2 = Unlikely; 4 = Likely; 5 = Very Likely)

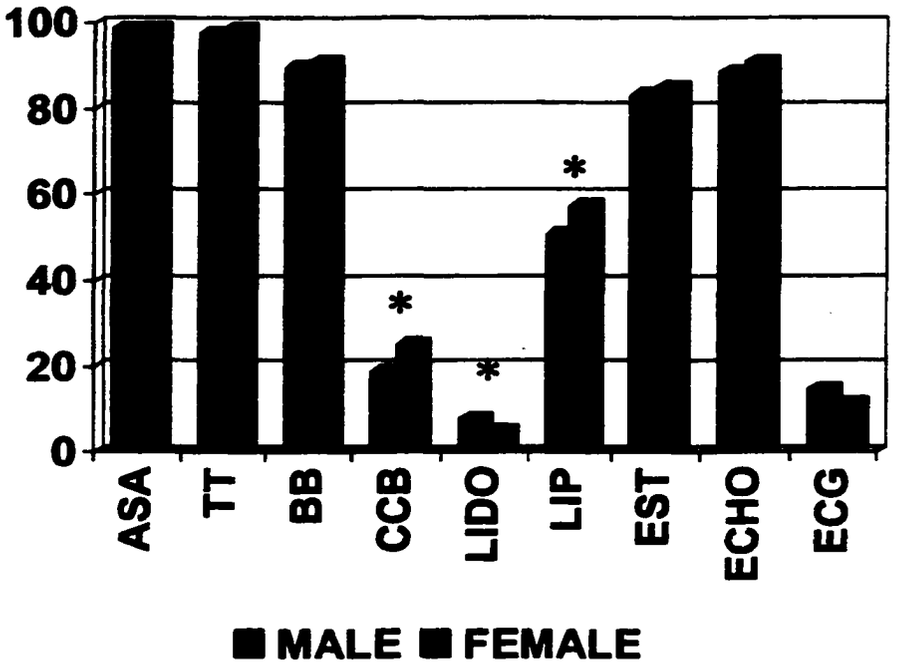


* denotes significant difference in mean utilization at the 10% level or less

Treatment Patterns by Respondent Sex

There are some minor differences in treatment patterns based on respondent sex as illustrated in Figure 7, however, none are significant at the 99% level. At the 5% significance level, Table 15 (Appendix C) illustrates that there are differences for calcium channel blockers and serum lipid profile, and in both instances, female physicians are more likely to utilize the therapy or test. At the 10% significance level, males are significantly more likely to utilize lidocaine than are female respondents. There does not appear, however, to be a consistent pattern to these differences.

Figure 7: Treatment Comparisons for Therapy and Risk Prediction for AMI, by Respondent Sex



% refers to proportion of respondents choosing likely or very likely to utilize a treatment or test

* denotes significant difference in treatment patterns at 10% level or less

Treatment Patterns by Respondent Training Location

There are some differences based on the geographical location of physician training. Physicians trained in Canada were significantly less likely to utilize calcium channel blocker, lidocaine and an ECG Holter monitor, and were significantly more likely to use an echocardiogram. Those trained in the United States were significantly more likely to use an ECG Holter monitor, as were those trained outside North America. As well those trained outside North America were significantly more likely to use calcium channel blocker, lidocaine and ECG Holter monitors, and were less likely to utilize an echocardiogram. The main differences appear, then, to be between physicians trained within North America and those outside of North America.

Treatment Patterns by Respondent Experience

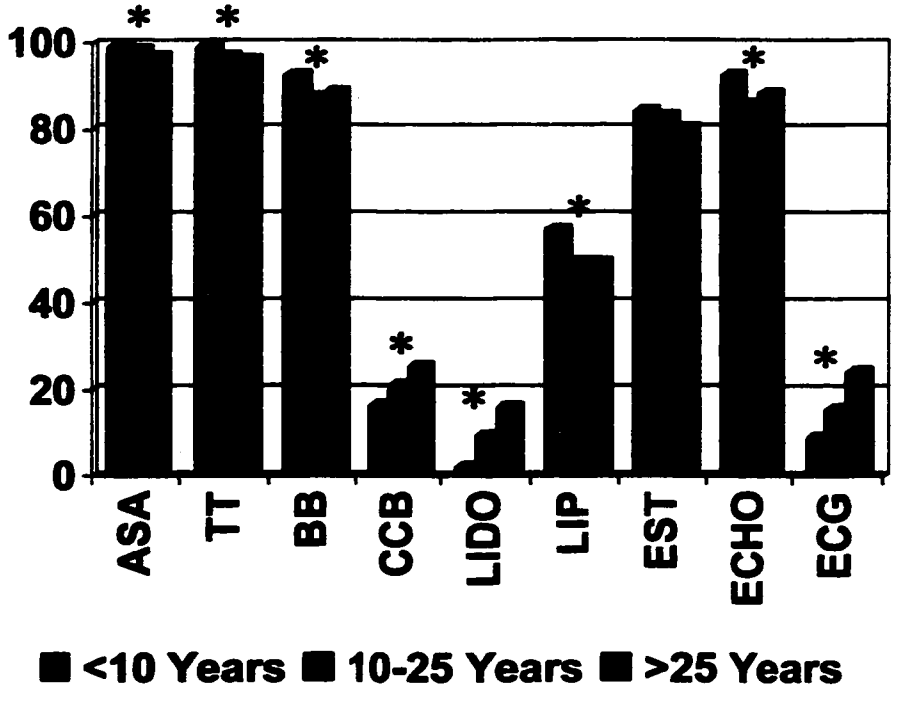
The most consistent pattern for differences in treatment patterns resulted from examining the data based on respondent clinical experience, or total years of medical practice (Appendix C, Table 16). For this analysis, the years of experience data were divided into three categories, less than ten years experience, between ten and twenty five years of experience, and greater than twenty five years. The respondents were divided in such a way as to define relatively new physicians with little practice experience (<10 years), versus those that were building their practices or academic careers (10 to 25 years), and those that have the most clinical experience and were in a relatively stable or

potentially declining part of their career (>25 years). Other divisions could also be utilized, however, it is likely that the results would be similar in nature. All therapies and tests, as illustrated in Figure 8, except for exercise stress test, resulted in significant differences (at the 90% confidence level) in treatment patterns, and there was a relatively consistent, and at first pass, apparently paradoxic, similarity in the treatment differences. For aspirin, thrombolytic therapy, and beta blocker, as experience increased, the physician was significantly less likely to prescribe these proven therapies. It must be noted, however, that for beta blocker, there was no difference between the middle and upper categories for years of experience. For calcium channel blocker and lidocaine, as experience increased, the physician was significantly more likely to prescribe these non-proven therapies.

As well, for serum lipid profile measurements and echocardiogram, as experience increased, the physician was significantly less likely to utilize the risk prediction test, but again, little difference in intended utilization rates were evidenced between the upper two categories. And, for ECG Holter monitor, as experience increases, the physician with the least experience was significantly more likely to utilize this test. The analysis suggests that, while it may be tempting to utilize years of experience as a predictor of decision making behaviour, the results suggest that even the physicians in the mid-range category of experience may not be making the most appropriate decisions. Thus

it would be premature to suggest that a specific group is the 'cause' of any the treatment differences with respect to age.

Figure 8: Treatment Comparisons for Therapy and Risk Prediction for AMI, by Respondent Years of Practice



% refers to proportion of respondents choosing likely or very likely to utilize a treatment or test

* denotes significant difference in treatment patterns at 10% level or less

Treatment differences were also evaluated by respondent age with a similar pattern emerging. Significant differences for thrombolytic therapy, calcium channel blocker, lidocaine and ECG Holter monitor were found (Appendix C, Table 17). While the age-based comparison produced a consistent illustration of less utilization of efficacious treatment with age, years of practice experience

may be a better alternative to examining treatment differences as age may not as consistently be representative of experience. There were no differences in treatment decisions based on reimbursement or how the physician spends the majority of their time, either in clinical/patient care, research, teaching or administration.

Treatment Patterns by Work Setting

Another analysis looked at treatment differences based on type of practice: group practice, solo practice, and other types. Two significant differences in treatment patterns arose from this analysis. These were for echocardiogram and thrombolytic therapy. In both cases, if the physician is in a solo work situation (as opposed to any other situation) they are more likely to request an echocardiogram and are less likely to utilize thrombolytic therapy. While these findings may be anomalies, there may be issues related to access to continuing medical education or access to consultation with colleagues that may influence the decisions made for treating AMI's and the tests utilized to confirm the diagnosis and subsequent treatment.

Analyses of treatment patterns by work setting showed significant differences in all treatment patterns, except aspirin and thrombolytic therapy. This could be expected, given that differences exist by specialty, since specialists, in particular cardiologists and internists, would be more likely to practice in a work setting which includes a group practice, access to on-site angiography, angioplasty and

bypass treatments, as well as the presence of on-site trainees, which may lead to a more up to date knowledge of the current literature in specific areas.

All significant differences were at the 99% confidence level or greater, however, it is to be noted that splitting the data again, to another level, results in some small sample sizes for some of the chi square tests. While this an interesting result, it should be looked upon with caution, because of the risk of play of chance error.

Treatment Patterns by Patient Age and Sex

The data were analyzed based on the age of the patient and the sex of the patient in the case scenario. This brings us back to the main question of the survey, and that is, are there any differences in treatment patterns based on patient age and sex. A summary of the analysis with respect to these potential differences may be viewed in Appendix C, Table 18.

No differences based on patient sex are evident. While many audits have shown sex differences in management to be present in univariate analyses, the evidence is not consistent. And, even in univariate analysis the quantitative difference based on sex has not been as great as the age-based differences. Moreover, repeated mulitvariate analyses of the CQIN audit data have consistently revealed only older age to be an independent predictor of increased risk, not either male or female sex. Overall, the data from this questionnaire are compatible with the weight of evidence from CQIN and as presented in the

literature review, favouring no real differences in treatment patterns based on patient sex.

Both types of prior analyses do confirm the differences based on age and are seen in Figure 9 below. With respect to age of the patient in this research, significant differences in treatment patterns were illustrated for two therapies and two risk prediction tests. Thrombolytic therapy and beta blocker were both more likely to be prescribed for the younger patient than the older patient, while a serum lipid profile and exercise stress test were also more likely to be included in the usual care for the younger patient. This suggests then, that even in a hypothetical case scenario, physicians are aware of patient demographic characteristics and account for them, either consciously or unconsciously, in their treatment decisions.

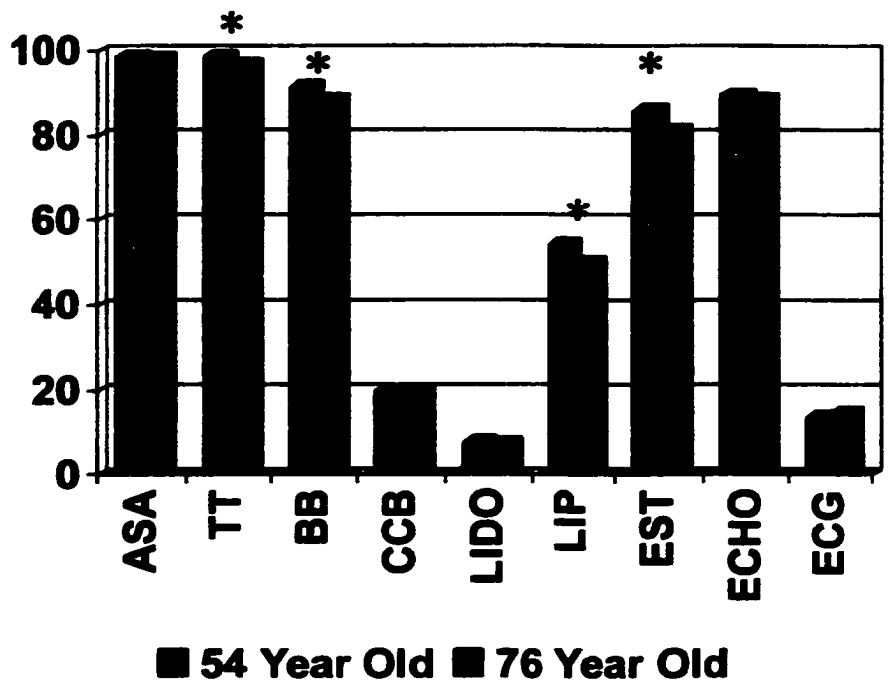
Further analyses of the treatment patterns were conducted for drug therapies and test by specialty, broken down by age of the patient. Significant differences occurred for cardiologists with the utilization of lidocaine (p=.042) only and this is likely the result of a very small sample size for the likely and very likely response categories. For the internists, significant differences occurred for lidocaine (p=.02), and were likely apparent for a similar reason of small sample size. The GP group analysis resulted in more significant treatment differences including exercise stress test (p=.014) and thrombolytic therapy (p=0.008), suggesting that thrombolytics are more likely to be withheld from elderly patients than from younger patients. Finally, in the other specialty category, serum lipid

profile was found to be significantly different for the older versus younger patient population, with younger patients more likely to receive a serum lipid profile than their elderly counterparts (p=.003).

It is tempting to further reduce the data to determine if the existence of age-based treatment differences result from the previously outlined respondent age or experience categories. Analysis which breaks out these categories by age and experience levels suggests that while treatment differences based on age are more consistent in older and more experienced physicians, age-based treatment differences exist across all categories of age and experience levels. Subsequent multi-variate analysis was not undertaken to further establish the source of the treatment differences. Two important reasons figured in this decision. First, the research design did not, a priori, allow for this analysis. The number of responses in the lower and upper age and experience ranges is much less than in the mid-range category. What remains unknown is the representativeness of these then much smaller physicians groups. Perhaps more consequential is the potential for future interventions to be focussed solely on the upper category of physician age and/or experience. Given that this research is unique in attempting to identify the isomorphic mechanisms which result in the generation and maintenance of particular physician practice patterns, a more inclusive, rather than divisive, approach appears to be warranted. A subsequent survey with a large sample focussing on this question

specifically would offer a better approach and would reduce the risk of differences occurring by chance alone.

Figure 9: Treatment Comparisons for Therapy and Risk Prediction for AMI, by Age of Patient



% refers to proportion of respondents choosing likely or very likely to utilize a treatment or test
* denotes significant difference in treatment patterns at 10% level or less

Decision Factors

Given that differences in treatment do exist, both in the literature previously presented and in this large, self-administered questionnaire data base, the next logical question is what influences the treatment decisions of physicians. An attempt was made to elicit this information in the context of the questionnaire.

Results of this are illustrated in Tables 19 and 20 (Appendix C) and a summary of these results is illustrated in Figures 10 and 11.

Figure 10: Mean Level of Influence of Decision Factors to Utilize Therapy for AMI

(1 = not at all; 3 = somewhat; 5 = substantially)

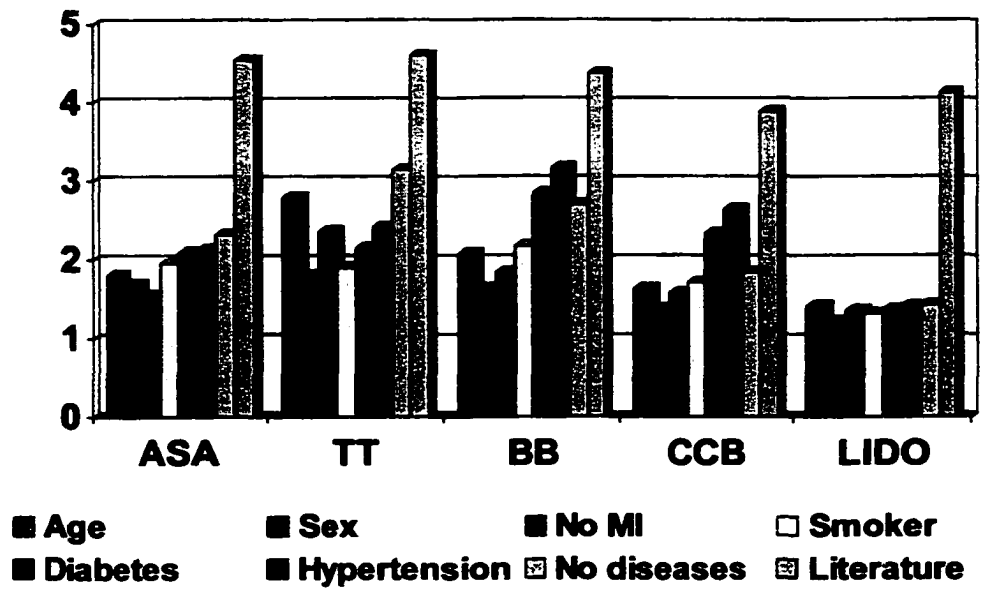
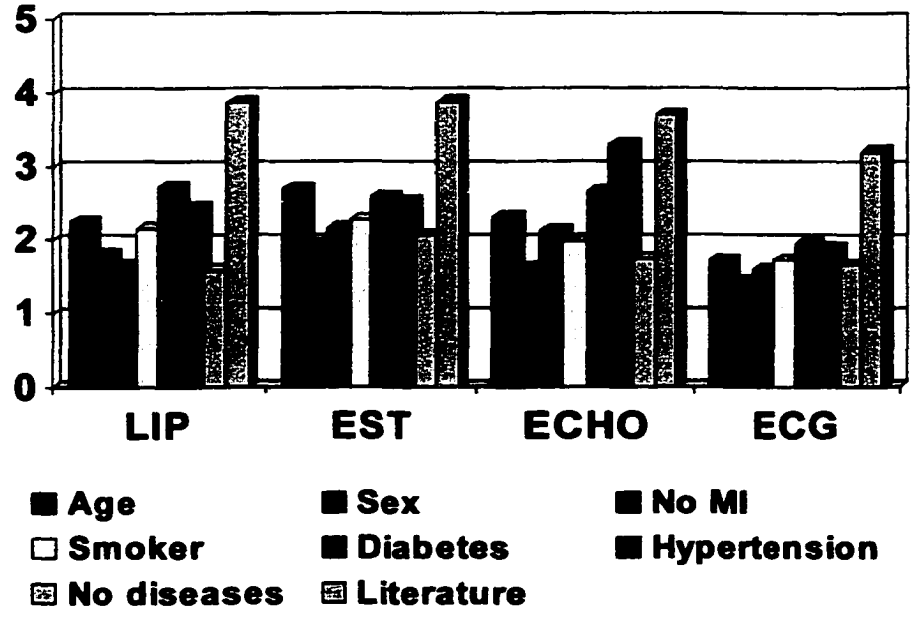


Figure 11: Mean Level of Influence of Decision Factors to Utilize Risk Prediction for AMI

(1 = not at all; 3 = somewhat; 5 = substantially)



Observation of these results suggest that while there are some variations in how much factors such as age, sex, the presence of diabetes and hypertension, etc, influence the decision making process, it is, according to the respondents, the current literature that influences, to the greatest degree, their choices of therapies and risk prediction tests. This observation is consistent over each drug therapy and risk prediction test, but the analysis also makes evident that the literature is somewhat more influential with respect to prescribing drug therapies than for decisions regarding the utilization of tests. This can be seen in the relatively lower means for the level of influence for each therapy or test.

Overall, the results indicate that age of the patient influences to a greater extent decisions for use of all therapies and tests, than does the issue of patient sex. Again, this is consistent with the overall results based upon the four cases. As well, the presence of hypertension and diabetes appears to have an impact upon the clinical decision-making more than a history of previous AMI, the patient being a previous smoker, or the presence or absence of other medical diseases.

Summary of Questionnaire Results

The questionnaire results have established that clear treatment differences exist for the management of AMI patients, and the level of significance of these differences is very strong, suggesting that such differences have not been generated by play of chance. The respondents' own ranking of factors influencing the treatment decisions was most strongly weighted to the use of the current literature as the source of justification or rationale for treatment decisions. The results also indicate that treatment differences based on patient age exist, again, at a very strong level of significance. This result confirms, utilizing self-reported data, reports of such treatment differences in the medical literature, many based on retrospective chart review. This research extends these results to a broader physician group, across a large geographical area. These differences were not evident based on patient sex, which may have been predicted from the inconsistent reports in the medical literature. Finally, the questionnaire results assists in understanding that these treatment differences

are related to a number of factors, most strongly the respondents' length of experience and age, as well as physician specialty.

Scrutiny of the data suggests that there are no appreciable differences in the level of influence of each factor for the specific drug therapies or risk prediction tests based on province (Appendix C, Tables 21 to 29). Similarly, there is a consistency to the data based on specialty (Appendix C, Figures 30 to 38). In all cases the mean influence is lowest for cardiologists and increases for internists and again for GP's.

Interview Results

A total of 54 interviews were conducted in the five provinces; 11 in Alberta, 11 in British Columbia, 10 in Nova Scotia, 10 in Ontario, and 12 in Quebec. For the purposes of this thesis, the interviews in Alberta, British Columbia and Nova Scotia will provide the basis for analysis and interpretation. The interviews lasted approximately, on average, 45 minutes.

In the initial segment of the interview, the verbal protocol analysis was completed utilizing the hypothetical case and treatment questions from the questionnaire. The second aspect of the interview introduced open-ended questions for each respondent to answer, beginning with their understanding of how their own practice patterns were formed. Discussions covered a variety of topics related to physician practice patterns, including perceptions of the medical literature, Continuing Medical Education, the role of medical school, residency

and internship in forming practice patterns, the influence of mentors and opinion leaders, the perceived impact of quality of life issues and patient preferences, and finally, the physicians' interpretation and response to the age and sex differences in treatment for AMI. Each interview was tape recorded and subsequently transcribed. Analysis was also divided into the two aspects of the discussions. The verbal protocol analysis of the decision making process for the treatment choices was analyzed separately. Table 39 illustrates the results of the treatment choices for the 32 interviews utilized for this research.

Verbal Protocol Analysis

Table 39: Treatment Choices for Verbal Protocol Analysis Interviews

(1=Very Unlikely; 2=Unlikely; 4=Likely; 5=Very Likely; NA=not applicable; KN=don't know)

		DRUG THERAPY*					RISK PREDICTION*			
TRAN.	SPECIAL.	ASPIRIN	LYSIS	BB	CCB	LIDOCAINE	LIPIDS	STRESS	ECHO	HOLTER
1	INTERN	5	5	5	1	1	5	5	4	1
2	GP	5	5	5	5	1	1	5	5	1
3	CARD	5	5	5	2	1	5	5	5	1
4	INTERN	5	4	4	KN	1	5	5	2	1
5	CARD	5	5	5	1	1	5	5	5	1
6	ER	5	5	5	1	1	5	NA	NA	1
7	CARD	5	5	5	1	1	5	5	4	1
8	INTERN	5	5	5	2	1	1	5	5	1
9	ER	5	5	1	1	2	NA	NA	NA	NA
10	INTERN	5	5	5	2	1	5	4	4	1
11	GP	5	4	5	1	1	1	NA	2	2
12	GP	5	5	5	1	1	5	5	5	1
13	GP	5	5	2	KN	1	1	5	5	1
14	ER	5	5	4	KN	1	KN	NA	4	NA
15	CARD	5	5	5	1	1	5	5	5	1
16	CARD	5	4	5	1	1	1	4	5	1
17	INTERN	5	4	5	2	1	5	5	4	1
18	ER	5	5	4	1	1	1	NA	NA	NA
19	GP	5	KN	2	1	4	5	4	4	1
20	ER	5	5	5	2	1	1	NA	NA	NA
21	CARD	5	5	4	1	1	5	5	4	1
22	INTERN	5	5	5	2	1	1	5	5	1
23	GP	5	5	5	1	1	5	5	5	4
24	CARD	5	4	5	1	1	1	5	5	1
25	GP	4	5	2	2	1	5	5	4	2
26	GP	4	4	1	KN	1	1	4	5	1
27	GP	5	5	5	1	1	5	5	2	1
28	CARD	5	5	5	1	1	1	5	2	1
29	GP	5	5	5	1	1	5	5	5	4
30	GP	5	5	4	2	1	5	4	2	1
31	CARD	5	5	5	1	1	1	4	5	1
32	INTERN	5	5	4	2	1	2	5	5	1
AVG.		**4.94**	**4.81**	**4.28**	**1.46**	**1.13**	**3.30**	**4.77**	**4.18**	**1.29**

As illustrated in Table 39 above, and similar to the questionnaire data, the treatment choices in terms of drug therapies are clear, with aspirin and thrombolytic (lysis) therapy very likely or likely to be used in all cases except one. The likelihood of use of beta blocker is slightly more variable, suggesting, again, that even though current medical knowledge would anticipate its use in the case of AMI, physicians are less than sure of its use for this purpose. Lidocaine and

calcium channel blockers are very unlikely or unlikely to be used in all cases except two. Similarly, for risk prediction, it seems clear that physicians would utilize an echocardiogram and an exercise stress test. However, there is much more variability in the use of the echocardiogram, similar to carrying out a serum lipid profile within 24 hours. Some of this is due to emergency room physician responses, in that they do not appear to be the individuals usually ordering such a test, however, there are still disagreements among specialists, as to the value of this particular test. Physicians are also unlikely, on average, to order the use of a Holter monitor. The patterns of utilization seen in this small sample are very similar to the parent sample of 2136 physicians, indicating that randomization worked to produce a representative sub-group for the verbal protocol analysis (Table 40).

Table 40: Comparison of Mean Likelihood Scores for Use of Therapy and Risk Prediction for Questionnaire and Interview for AMI

(1=Very Unlikely; 2=Unlikely; 4=Likely; 5=Very Likely)

	QUESTIONNAIRE	INTERVIEW
Aspirin	4.92	4.97
Thrombolytic Therapy	4.82	4.81
Beta Blocker	4.28	4.28
Calcium Channel Blocker	2.21	1.46
Lidocaine	1.46	1.13
Serum Lipid Profile	3.05	3.30
Exercise Stress Test	4.08	4.77
Echocardiogram	4.26	4.18
ECG Holter Monitor	1.94	1.29

Stratifying the data by specialist, again, it can be seen that cardiologists appear to make relatively homogenous treatment decisions, and variability increases as one moves to internists and then to GP's.

Perhaps of greater interest is the analysis of the perceived factors that influenced the decision to utilize a treatment or risk prediction test. To varying degrees, physicians were able to articulate which of the factors, including those that were not included in the survey, influenced them to use or not use each treatment choice.

Aspirin

Aspirin was clearly the most easily chosen treatment and current literature was identified as substantially influencing that choice on 21 occasions. Of those physicians who chose the current literature as the major influence on this decision, three also said that it was standard practice for their treatment of MI's. In seven cases, a physician was unable to articulate clearly the reason for his/her choice, other than to suggest that that was, simply, standard practice for treating heart attack. This may not imply that these physicians did not know the reason why, only that for the verbal protocol analysis, they were unable to clearly state why aspirin was used in this case. In one case a physician expressed that their personal experience substantially influenced their choice. An example:

> "Overall likelihood of the use of aspirin. One hundred percent. I don't have anything influencing me here at all. It works."

One very important point to note is that even though physicians may have suggested the current literature was the major factor influencing the choice of aspirin, rarely was the actual literature being utilized cited or referenced to any great degree. This was, indeed, the norm for aspirin and all other treatment

options, except in the case of three cardiologists, who were able to be very specific regarding which study or clinical trial they were basing some of their decisions on, as well as the total decision process being used to determine the appropriateness of each treatment:

> "Overall likelihood of the use of aspirin? Very likely. 98% of our patients will get aspirin unless the patient is allergic or has an active GI bleed, which should not use aspirin. So again, since we're going to use it in almost every situation, the factors which influenced my decision, really none of these factors are a concern. Age, sex, previous infarct, no previous smoker, no, the only situation there is if the patient were asthmatic and it is the rare patient that has allergies to aspirin with the worsening of asthma. Diabetic, no, unless they have an active retinal hemorrhage or something and an opthamologist tells me not to use aspirin. Hypertension, no, no other medical diseases, no. Current literature, yes, aspirin decreases mortality in stable angina, unstable angina, post myocardial infarction and in the acute myocardial infarction from the ISIS2 study."

Thrombolytic Therapy

Turning to thrombolytic therapy, 19 physicians indicated, again, that the current literature substantially influenced their choice to utilize this treatment. To be clear, again, a reference to the literature did not usually include any specific information regarding trials or journals. More likely, it took a form similar to the following reasoning:

> "Overall likelihood of use of thrombolytic therapy would be very likely. And age, sex, previous MI, smoking, diabetes, hypertension, none of those things would influence that. The only thing that would influence my decision would be if there was an obvious contraindication, and the history here doesn't show any contraindication. And my decision to do this is based on the current literature which clearly shows improved outcome in MI."

There was a variety of other reasons articulated, in addition to the current literature, including that it was standard practice for this type of patient (n=5), some discussion regarding the perceived risk/benefit of this particular drug choice (n=3), as well as the perceived safety of the drug (n=1). Age was suggested as a reason not to treat in two cases and as a reason to treat in one case. Perceived side effects because of patient sex (n=1) and age (n=1); because it is indicated; clearly not a sufficient justification for use or non-use (n=1) were other stated reasons, and, finally, one individual simply could not articulate the reason for use in this instance.

Interesting data also emerged regarding the preferences of physicians that depended on their clinical interests or type of specialty or sub-specialty. Even though one physician clearly articulated the justification for the use of thrombolytic therapy with the statement:

> "Current literature clearly is a factor, at least ten years of data suggesting decreased mortality with thrombolytic therapy in the first 12 hours of the infarct, and this patient was at 4 hours so the earlier the better",

contradictions were apparent as this same physician's conflicting preferences (or prejudices) emerged during the discussion with the statement:

> "being an interventional cardiologist and having access to a cath lab is that we're doing more direct angioplasty for acute infarctions. So the patient clearly needs the artery open and thrombolytic therapy versus direct angioplasty is something to consider. So in most situations we would do one or the other."

Many physicians held the perception the safety of this treatment option had to be weighed against the age and sex of the patient:

> "The age of the patient I think about. She's not that old so I would still do it. We know that women, especially small women are more likely to bleed, but still that wouldn't stop me."

Contrast this with other statements regarding the suitability of thrombolytic therapy in elderly patients such as this:

> "that age of the patient, well, this patient, even if this patient was 86, the benefits to the patients would outweigh the risk here, so the age of the patient does not influence my use of the therapy at all."

From these statements and others of a similar nature, it can be concluded that age is a factor in the decision to utilize thrombolytic therapy, without a clear consensus regarding exactly how it should or should not be factored into the decision to treat. Some respondents discussed the age and/or sex of the patient without offering it as an influential factor in this case, but as a factor to be considered in the use of this therapy or a factor that has changed over time or that they weren't sure how to deal with. Obviously, there is uncertainty regarding this issue as evidenced by the variety and contradictory nature of these statements.

> "The sex and the age, well, I don't know what the current recommendations for the age are."
> "The age of the patient, thrombolytics, the risk increases with increasing age but is still probably safe unless contraindicated here."

"That age of the patient, well this patient, even if this patient was 86, the benefits to the patients would outweigh the risk here, so the age of the patient does not influence my use of the therapy at all."

These statements can be contrasted with the following statement that suggests a certainty regarding the use of this treatment.

"Overall likelihood of thrombolytic therapy is very likely, almost certain. What factors influenced my decision? The age and sex are not particularly relevant. The lack of a previous MI, the only issue that would raise is whether they'd had previous streptokinase and whether that would dictate the choice of agent that I used. Whether they're a previous smoker, diabetic not an issue with respect to thrombolysis. Hypertension is a bit of an issue and uncontrolled hypertension is a relative contraindication to thrombolysis. So if there's uncontrolled blood pressures over 185/110, I would like to try and control those a little bit, although it's not really clear whether that would reduce the risk. So the hypertension is something I would think about, but certainly these levels of hypertension are not an issue. Other medical diseases? Well, there's lots of medical diseases to consider when you're going to give thrombolytics. I guess the most important ones would be whether they had an underlying CNS problem in particular, previous strokes, intercranial masses or tumors, aneurysms, AV malformations, basically any intercranial pathology is a relative contraindication to thrombolysis. Concurrent use of other anticoagulants would be something that would really make me consider the need for thrombolytics. Very recent surgery, within a couple of weeks, would make me consider the need for thrombolytics. An active bleeding disorder, a recent GI bleed would make me consider that. All of those again would be relative rather than absolute contraindications and you'd have to look at the perceived or likely benefit versus the perceived risk of giving the drug. I think the overwhelming factor in a decision like this is the current literature, which obviously suggests that, along with aspirin, thrombolytics are probably the things that decrease acute mortality and maybe long term outcomes the most."

Beta Blockers

In the use of beta-blockers, the current literature was cited 25 times as being the most substantial influence on the decision-making process. Additional rationale for utilizing this therapy included: because it is standard practice, either by the physician or their practice setting (n=6); decision was based on experience (n=2); because it is indicated (n=2); and, one respondent suggested that the patients' multiple medical problems would influence the decision to utilize this treatment. Again, it was not the norm for a physician to describe the specific literature to which they were referring. This is an interesting point, as both thrombolytic therapy and beta-blockers were found to have significantly different treatment utilization patterns based on patient age, and yet in the interview data, it appears there was more consistency, in that all respondents, at some point, were able to articulate the need for thrombolytic therapy, regardless of the age of the patient, even though there was a common perception that thrombolytic therapy was a risky therapy, particularly for the elderly. On the other hand, no such consistency emerged regarding beta-blocker utilization.

Calcium Channel Blockers

The rationale for not employing calcium channel blockers was also consistent with the other verbal protocol data. Current literature was referred to twenty-three times as being substantially influential in the decision. As well, that this therapy was not indicated was mentioned four times; in three instances the physician was unable to articulate the reason for use or non-use; one

respondent suggested that it was due to standard practice and one respondent said that the age of the patient influenced them to utilize the therapy.

Lidocaine

Lidocaine, the least likely therapy to be utilized for this case by the interview respondents, elicited a variety of reasons for its non-use (or use in one case). Twenty-four respondents suggested that current literature significantly influenced their decision, with four participants indicating that it was not indicated in this hypothetical situation. Two respondents based their decision on their clinical experience, while other reasons included: that a local opinion leader influenced the choice (n=1); that it was standard practice (n=1); and, one respondent was unable to articulate the rationale.

Serum Lipid Profile

The risk prediction tests resulted in much greater variability in the influential factors for treatment, as might be expected, based on the perceived lack of definitive data to suggest when these tests should be utilized, or the value of the results when completed. There appears to be confusion regarding the appropriateness of performing a serum lipid profile within the first 24 hours. Fourteen respondents indicated that the literature figured substantially in their decision, however, as the mean likelihood score was 3.30 for these respondents, it is evident that the literature is either not clear on the appropriateness of this procedure, there is some controversy regarding its usefulness, or the literature has not been disseminated or taken up by the respondents in a consistent

fashion. All of these potential reasons came out of the verbal protocol analysis for this question. Of these 14, three indicated that their choice was also influenced by standard practice in this area. Nine respondents indicated that their decision was based solely or substantially on their standard practice for this issue. An additional six respondents did not articulate any rationale for their choice. One respondent suggested that the patient's age and sex, the presence of other diseases, and the patient's smoking were all reasons to perform this test.

> "Overall likelihood of serum lipid profile within 24 hours of admission? Very likely. Again, because of the diabetes and the high blood pressure and the smoking and her age, all those have to do, and I assume, she is 76, she is menopausal. So the sex and the patient I guess that she would be more likely to have less lipid protection from estrogen."

Exercise Stress Test

A similar pattern emerged in terms of the use of an exercise stress test for risk prediction and stratification. Fifteen respondents cited the current literature as influencing their decision to conduct or not conduct and exercise stress test on the AMI patient in question, with three of these 15 also mentioning that it was standard practice. Six individuals suggested that it was solely standard practice for their treatment of these patients, while other reasons given included being based on experience (n=2), and that it was indicated in this instance (n=2). One respondent cited age as influencing the decision somewhat and went on to elaborate the decision-making process.

> "It is not so much age I'm thinking about, as her quality of life. Like what kind of 76 she is? If she is frail and her obstructed lung disease is significant, she is not likely to benefit from a pre-discharge exercise stress test. If she is a good 76, and is happy and active and all the rest of it, then it might be worthwhile trying her on it and see how far she can get."

This statement is indicative of a more general perception from the comments that age is often used as a surrogate measurement for quality of health or quality of life, with some ill-defined attempt to discriminate chronologic age versus biologic age indications. More will be said regarding this issue in the analysis of the open-ended question responses.

Echocardiogram

The question of the echocardigram illustrated the least consistency in terms of reason to utilize or not. Twelve respondents cited the literature as a reason for their decision, however, seven individuals also suggested that it was based solely on being standard practice and four suggested that it was indicated in this case. Other reasons included age and sex as a reason to conduct the echo, where we again see decisions about age perhaps reflecting other biases about elderly patients and the suitability of treating or risk stratifying them.

> "Unless the patient was 97 years old or something and you didn't think that risk stratifying with a view to trying to modify their risk was important."

Other respondents indicated that they made the decision based on experience, due to the input of nearby opinion leaders, that their peers or colleagues practice in this manner and that guidelines suggested it.

While an ECG Holter Monitor was unlikely, on average, to be used in the treatment of this AMI patient, respondents provided varying reasons for the decision. Ten cited the current literature as the reason for the decision, while an equal number said that it was not indicated in this case. Standard practice or experience were also expressed (n=4 and n=3, respectively) as being used to make the decision.

The data analysis also looked for trends based on specialty of the physician. Other than the general conclusion that some of the cardiologists were best able to identify the ultimate source of their justification, in terms of the literature or specific clinical trial(s), no major trends surfaced that would identify notable differences in decision-making patterns between the physician groups.

Open-ended Questions

The remainder of the interview posed general, open-ended questions to the respondents. Five principal areas were covered, with a standard introduction and interview protocol being utilized (Appendix B). The first question asked the physician for their ideas or understanding of how their own practice patterns developed or were influenced and/or what might occur that would prompt them to change, in a substantial manner, a specific practice. Here again, many physicians (n=15) suggested they felt the literature influenced them to a large degree, however, only two thought that this was the only influence on their

practice patterns. Other influences that were referred to included: the physician's own practice patterns were influenced by experience or expertise, based on their clinical care (n=9); by training and by local/regional opinion leader (n=8); by specialist opinion leaders, either regional, national, or international specialists (n=6); by valid, well-designed and conducted clinical trials evidence (n=5); or that they already practiced "evidence-based medicine" (n=5); and, five respondents suggested that their practice patterns were significantly influenced by Continuing Medical Education (CME).or that they utilized consensus guidelines to form their practice patterns. General medical journals (from the Canadian Medical Association, for example) were mentioned on four occasions.

The Influence of the Literature

In an attempt to better understand, then, what was meant by 'the literature', respondents were further questioned what exactly that term meant for them. Generally, cardiologists, and to a much lesser extent, internists and emergency physicians, utilized sub-specialty journals and associations as their source of their information, to the exclusion of general journals or association such as the Canadian Medical Association or their provincial counterparts. Such journals and associations, along with the large, annual meetings in cardiology in Canada and the United States, appeared to be the source of information on which cardiologists based their practice patterns, in particular for AMI, but also for all other cardiac diseases. Several cardiologists mentioned that this is a relatively small community, particularly for those that have other sub-specialty interests

such as interventional cardiology. This being the case, most of the players knew each other, or of each other, and formed opinions of 'leaders' in the field based largely on alignment with the author's opinions and their track record in the field.

> "Only I suppose to the extent that their opinions coincide with what I think that the literature or recent studies demonstrate or that they're people that are involved in those kind of studies."

Not a single cardiologist mentioned reading outside the sub-specialty or that they found guidelines or other information they received from general medical associations useful in any way. In fact, most felt that these types of organizations were simply political arenas that contributed little or nothing in terms of clinical patient care.

> "I really don't think I give them any weight, quite frankly, because my perception of those kinds of organizations is that their main goal is not optimal patient care, that the best outcome for the patient is not their sole interest. So organizations that are essentially political organizations, like the ###### Medical Association, the ##### Medical Association, they're dealing with different issues and so position papers that come for those sorts of organizations, I might read with some interest, but I don't think that they would likely influence my practice. I mean there are other organizations like scientific organizations, I would consider those organizations in a different category from the political type organizations."

As well, it is apparent that 'the literature' and the meetings in cardiology are perceived as also being political at another level, in terms of what gets printed and who speaks.

> "Medicine's very political, as everything else is. And there are certain people who are asked to speak frequently at meetings because of political reasons. And there are people who published good studies ten years ago, who have gained a

> reputation, but who have done nothing since and who are continued to be asked to be featured speakers, or symposium leaders, who I don't think even necessarily keep up with what's going on, but for political reasons are continually put forth as experts."

Here, then, the impact, in terms of informing best practice, of the literature becomes less clear. The perceived political nature of the field has implications regarding what and who gets heard. Returning to the assumed certainty of 'best practice' in the treatment of AMI, each paper and expert is measured against the reader's or listener's own biases, interpretation of past literature and currently accepted treatments, as well as the perception of what colleagues are doing in the area. The nature of research funding in medicine in Canada, particularly in the smaller domains of sub-specialties, suggests that expertise is also a function of the perceived value of research work albeit perceptions by a small number of people. These perceptions are likely influenced to a large degree by similar issues as perceptions around practice patterns, such as the alignment with reviewers' attitudes and beliefs regarding what is important work to be doing and how it should be completed.

> "You know I think you have to just form your own opinion about these people. Now I go to a lot of meetings and I see a lot of these people speak. And I also do a lot of, in Canada and the US too, I do a lot of abstract reviewing, and I've spent about 15 years working for the ###### reviewing grants, I review a lot of people's work, and I rate their work. So I have perhaps a little more than the average...so I know that there are people who get up and make statements and who are highly touted, and then when I look at their CV, I'm not impressed. And when I look at the work they're proposing to put forward as a research application, I'm not impressed."

This professional structure influences to a great degree who and what gets heard, particularly at the specialty and subspecialty level. And this has important implications, then, for who and what gets heard by other groups of physicians outside the specialty, which has an impact on treatment patterns for specific patient populations. On average, GP's, Internists and Emergency physicians perceived that they were more influenced by information in general journals as well as in their own specialty. If this is indeed the case, it becomes important to understand what information gets printed in these types of journals and the source of the information. For example, which guidelines are chosen for publication, in national and provincial publications, as appropriate treatment patterns for specific disease states and how does this occur?

The literature also was important to internists, general practitioners and emergency physicians. Once again, however, the form and content of what was meant by literature varied. For some, the literature referred to any practice information from any source.

> "By literature what I mean is what I've read or what I have heard from specialists or learned from teacher. So, in other words, either current practices, as I have picked up, or things I've actually read in the literature."

Others were more specific.

> "My usual source would be, I read a few journals. Annals of Emergency Medicine, Journal of Emergency Medicine. And I get a few throwaways from (a pharmaceutical company), that review the various journals and there's sometimes useful information."

It was the norm for each group of physicians to rely on the medical literature in their own area (cardiology, internal medicine, family practice, and emergency medicine), however, all except for cardiology, on average, perceived information from general sources to also have an influence practice patterns.

This suggests that the literature influences practice patterns based on several structural components of the medical field. First, physicians rarely read outside their specialty, regardless of the fact that they may treat in other specialty areas. Second, literature that is regarded as 'important' or 'current' varies by specialty, but also within specialties, based on questions of clinical interests, possibly location of training, and each physicians' interpretation of the literature, which is fed by their own reading, activities such as journal clubs, meetings and conference attendance, and conversations and interaction with colleagues. This conclusion was reached from the number of times physicians referred to these types of activities as being an essential factor in guiding their thoughts and opinions regarding the literature. Most of these activities are structured around the division of labour within the institution, but also by professional norms regarding high status areas and lower status areas, academic versus private practice notions, and the perceived political nature of publishing and research funding activities.

The Influence of Opinion Leaders

This brings to the fore the influence opinion leaders, that is, those who offer information or are solicited for information based on the belief that they can and will provide reliable information. As previously mentioned, for cardiologists, opinion leaders tend to be those that are known and trusted through the development of a personal relationship:

> "That I might know personally, so the opinions of colleagues whom I work with on a daily basis, not all of them of course, but in certain areas and certain of my colleagues, would probably have more influence on my clinical practice than people who I may know through other connections nationally and so forth, but who I don't see practice themselves, day to day."

> "So I think personal experience plays a small role, but not a great role. And a setting like this, where we have access to all the cardiologists and personal experience of other cardiologists that you work with, is also important."

> "So I am personally driven by the literature and it tends to get modified by my own experience. And then in talking to colleagues who I have a lot of faith in and drive me along."

As suggested by these comments, opinion leaders for cardiologists are likely known to the individual, along with perhaps having knowledge of their body of work (publications, research studies, and the like) as well as their clinical practice patterns. This appears to be a standard description of opinion leaders in which most of the participants practice in large, urban areas and many are situated in academic centres. This does drive the research component of the institution of physicians and the general sense that the available literature, interpretation of that literature, and how one defines an expert in the field of

cardiology is driven by three major components: complementary or similar practice patterns for specific disease states, knowledge of the individual's publications and research work, along with the types of opinions they hold regarding sensitive issues in clinical practice, and, some component of trust or personal knowledge of the individual that would lead a physician to seek their opinion or have confidence in the opinions of that person. And, as might be expected, there is a shared perception that all cardiologists understand who the opinion leaders are and why they were chosen.

> "It's pretty evident who's opinion in certain areas. There are people who are sort of touted as opinion leaders in various areas, and you know, some of those people I respect highly and some of them I don't."

> There are recognized opinion leaders as far as I'm concerned in cardiology. I mean if #### #### says something about heart failure I am going to listen. I might have to disagree or argue or something, but generally he'll catch my ear. And #### ####, if he started talking about thrombolytics and so on, you're going to listen. If Joe Schmuk says it, you're going to wonder who the hell is Joe Schmuk. Well, if I say it here, from the #### hospital, who is going to listen sort of thing. The local people will listen, I think I can influence the local family practice."

The other specialty physicians that were interviewed had different perceptions regarding those individuals that they would define as opinion leaders. In this case, opinion leaders tended to be those individuals, either local or regional specialists, who were able to provide the physician with the information they sought. In smaller urban centres, this might be the consultant cardiologist or cardiology resident, for example, situated at the nearest, large academic centre. However, in many cases, the opinion leader was a local specialist, with some

perceived expertise in the area. This suggests, then, that standard practice patterns of that individual will be cascaded down in any particular geographical area.

> "How are physician practice patterns formed? I think, from my perspective, on the basis of clinical practice profiles, number two, probably, and number one on the basis of the role model effect of regional cardiologists, regional internists, regional authorities on management."

> "And sometimes we learn more over the phone or in the referral letter that comes back from some people, as to how we would treat this, maybe the next time."

> "I'd say the literature and contact with the cardiologists are about the same, because they're basing treatments on literature as well."

This quote also illustrates the hit and miss nature of this type of learning or understanding of appropriate treatment patterns. If the next patient with that particular problem does not reoccur for some time, the information given to the physician may well be lost and the original treatment pattern will resurface. As well, the information itself may or may not be current or appropriate, depending on the practice patterns of the opinion leader giving the information. As evidenced by the survey results, this seems to often be the case. This statement eloquently captures the essence of this process:

> "Because internal medicine remains a very small part of my practice, mostly I'm going to be influenced by reviews. Now in internal medicine, by reviews and specific issues that require me to go and look at them, as opposed to constantly scanning the literature. Because when I deal with internal medicine problems I do not want to be cutting edge, I want to be standard care. I want to do what I think is being done by most people, and therefore, I'm influenced by what the experts

> are telling me is the appropriate thing to do as opposed to me interpreting the literature. Which is different from what I do as a specialty. There I do interpret based on appropriate literature. I am part of setting that standard for the community instead here I follow what I think is the standard for the community."

Again, the interpretation of the literature is a very important feature of how information becomes absorbed into practice at the specialty level, which then influences the practices of generalists who often rely on those same specialists, both locally and nationally or internationally, to disseminate their knowledge of the literature for that area.

> "Well, the people that I don't know, like on a national or international level, I take it for granted that they're in a position based on the credibility. And more locally I get to know the people and I know who knows what they're talking about and who doesn't."

> "From my position here, if I'm making personal contact with somebody, it's certainly their availability, their willingness to answer questions for me, and have they in the past seemed to give reasonable answers. By and large, I will call the (hospital) rather than the university, because the attitude at the university is all of you hack doctors out in the country don't know what you're doing. And I have to spend a fair amount of time proving to them that I do know something and would they please answer my question."

Opinion leaders, then, are chosen for a vast number of reasons, the least of which seems to be their level of knowledge of 'current' and 'appropriate' treatment patterns. Issues involve perceptions of status as well as availability, perceptions of trust and credibility, not necessarily based on their past record, and alignment in terms of treatment patterns or perceptions of what is appropriate treatment.

To reiterate, the influence of the opinion leader, whether local, regional, national, or international, cannot be underestimated. Such opinion leaders drive what becomes part of the meaningful work in a particular area, how the literature is interpreted, who does the interpreting, and, finally, what interpretation reaches the ears of others whose behaviour is based on such opinions of appropriate care.

The Influence of Continuing Medical Education

Physicians also spoke of the influence of Continuing Medical Education (CME). Again, differences based on specialty were evident. Cardiologists rarely perceived the local CME activities to be of benefit, either to them in terms of increasing their knowledge level or awareness of issue, or to other physicians.

> "Well, some CME's definitely would. There are some specialized CME's that I would attend specifically because I'm interested in learning about how other people deal with certain clinical issues. Those tend, I suppose, to be in areas that are less commonly published, less broadly, or specially narrowed kind of segments. So for example, in my own area of interest in adult congenital heart disease, the CME's that I attend for those do have, could have significant impact on my pattern of practice in that particular area. For some of the broader areas like ischemic heart disease, then an individual CME probably influences my practice much less."
>
> "I have concerns actually about that. I'm not sure that they are as effective as they should be. And I think that one of the ways we see that is in patterns of practice analyses that demonstrate the use of aspirin and beta blockers in acute myocardial infarction and that sort of thing. We're not at the levels of usage that we should be at, as suggested by the literature, therefore we must not be communicating those results and that information very well. So I have

reservations about the effectiveness of those CME opportunities. It's mostly people who want to learn or who want to change things who go to them. And then they are usually the people who are probably more, their practices comply more closely to what a standard might be anyway."

"I think that a lot of CME doesn't focus on changing people's behaviour, so that the goals of the teachers are often unclear, so that rather than approaching things in a way that, to define a best practice or to actually change people's behaviour, it's often a lot more general and non-specific and fuzzy. There's not really clear goals, I guess probably it's the way that most of it is done."

"We don't do enough, as a profession or as a segment of the profession, regionally, to provide CME on an on-going basis. And that is really a deficiency that we should work really hard to get around. We tend to have left ourselves in pockets; we don't talk to each other very well. I don't think we ever talk about issues to move it forward, in terms of literature and things like that."

At the cardiologist level, only one physician could recall specific examples of CME's that had a significant impact on practice patterns. Again, this was in a very specific and specialty area.

"So when we go to one of these, if it is really high end, leading edge work that is being presented by good speakers who are able to make their point and basically tell you a good story and all the rest of it, obviously, we don't go in as total neophytes in the issues we understand of this, this is the kind of thing we go in with a significant amount of knowledge base and we polish it up. So, again, we make major changes. And we make them very quickly when we come back."

While at the GP and Internist level, physicians generally perceived that CME did, in fact, have some influence on their practice patterns, only one physician could recall an experience in which a CME, and specifically the way the CME course was taught, significantly influenced a pattern of practice:

"And we went there first day on Friday and you had to go through a test, a written test and mock patients. And I found out for myself that there was a tremendous amount that I did not know about osteoporosis and that I was not really providing a good service to my patients. So then the next two days we went through some sessions and then there was a repeat test at the end. And there was a tremendous difference when the test was repeated. I came back relatively more knowledgeable and realized the importance of prevention of osteoporosis. (If the test hadn't been conducted), in the first place I never would have improved because all the papers that come through go in the garbage, we don't have time to read those. And no one would have pointed out to me that you have not enough knowledge to look after osteoporosis. No one would have pointed it out to me. There was only one way of finding it out, it was this."

This seems to point to a relative ineffectiveness of CME, on average, as many physicians pointed out that they were extremely busy and didn't have time to read much of what crosses their desk. One can imagine that a passive intake of information in the manner in which much CME is presented, has little to no influence on changing physician behaviour. As one physician suggested, perhaps the standard method of delivery at CME's is not suitable to changing behaviour:

"I would speak strongly, the didactic lecture is probably not as useful as we used to think so. I think the interactive, small group sessions are definitely a much better learning format, I've found from experience. And I learn much better when I'm with a group of peers who are tuned into the same problem as me."

One reason for this is physicians are not able to qualify or quantify their own patterns of practice for specific diseases or prevention regimes. As will be examined in terms of the age and sex treatment differences in following

paragraphs, many physicians feel that often the data is not 'true' and/or that such behaviour is not reflective of how they treat their patients. This is also reflected in a general attitude that for most common diseases, such as AMI, ear infections (otitis media), and the like, physicians are well aware of the appropriate treatment options, but, based on the literature of practice audits as described in Chapter 2, this does not seem to be the case. As well, CME choices are influenced by many factors other than perceived need for knowledge in a particular area. Many physicians indicated that they chose specific CME's because of the location, which allowed them to take extra days for a holiday in a nice place, because of family members in the area, because it fit in to their schedule and they needed to get some CME hours, and a variety of reasons unrelated to clinical practice.

> "To be quite honest, I went partly because the drug company paid for the flight and hotel room. A very influential factor was that my son was at (a university), so I could see him in the same process. And particularly he thought his choir's concert was that weekend."

There was also evidence that many physicians did not want to be practicing what they referred to as 'cutting edge' medicine, but rather they wanted to be doing what everyone else was doing.

> "You know, you get the cutting edge research presented at these meetings and then you hope that your practicing at, you know, that standard and, you know, putting the results of that research to work. It doesn't necessarily happen instantly. I mean, there is a lot of research presented at meetings and you don't immediately come home and then start practicing on the basis of one study that was presented. You tend to, at least, I tend to wait for local consensus, I think, when there is some debate in the literature, in implementing new therapies."

> "But if you are to start some new approaches, you would not want to be the only one extending out into the community. There are practice patterns."

> "So it is more of a consensus type thing, as opposed to a cutting edge, for GP's."

This sentiment was echoed by several physicians, which may be one illustration of why CME is not the best manner in which to change patterns of practice for proven, efficacious therapies, particularly those that are perceived to be uncertain or controversial in some way.

Similar to opinion leaders, the effectiveness and choice of CME's is often related to the speaker's talents:

> "And again, looking at who are giving those CME's, because certainly there are some people who are better at it than others, although the (national association) really tries to weed out who are good communicators and who are less apt communicators."

Generally, CME is less effective than the institution and the individual would hope. Personal and professional obligations, as well as perceptions regarding the presenters, have a substantial impact on which CME's are chosen, rather than evidence of deficiency or need in a particular area. As well, CME attendance does not guarantee a change in pattern of practice behaviour even if the session is well presented, interactive in some manner, and is intended to present accepted treatment guidelines or research, as many physicians wait to see some type of local consensus regarding acceptable treatment before changing behaviour. And this, as previously discussed, is fraught with problems

based on source of the information, patterns of practice of the local or regional 'expert(s)', and other interactions that significantly influence behaviour.

The Influence of Training and Experience

Training and experience figures substantially in respondent's discussions regarding activities that influenced patterns of practice. Overall, the data illustrate that this particular activity is likely to influence physician behaviour much more than they are aware or are willing to recognize. There appeared to be, however, a substantial difference between how respondents viewed the contribution of residency and internship, compared with medical school.

> "I think probably internship and residency was more influential than medical school."

> "Personally, medical school to me, you can get good theoretical knowledge, but I don't think it influenced my practice much. I think my practice was influenced more by internship and more by my peers that I respected and stuff like that."

> "I think when you're learning you have no base. So you start with a base, and you get the base from books. But as you know, a textbook is five years out of date. So you get the base, what's an ECG, what's the heart, where is it, etc. But then the majority of your early learning is from teachers at the medical school level, and then mentors as you go through. So when you start off in residency, for example, you have a knowledge base, but you don't know all the studies, and really I think at that stage, you're very dependent on the experience of people you work with. So as a resident around the CCU, well, you're going to learn by what is being done around you. So if the doctor that you're working with is giving streptokinase or TPA or whatever, then the first thing you're going to do is learn by what's going on around you, by sheer repetition, about what's going on."

More specifically, and as pointed out in the above statement, many respondents pointed to the role of mentors and role models in their development and the influence of this on patterns of practice. Some physicians were able to illuminate how this occurs:

> "I think as a medical student, as house staff, as residents, I mean we read, but we are influenced a lot, I think, by the mentors that we have as we go through. I think one of the good things about medical teaching is the opportunity to have so many different mentors. In a good training program one has a lot of potential teachers, so one ends up taking a piece of what all of they do, how they interpret things, how they treat things. And you use that, and you grow with that. You may alter it in some way, but the kernel was placed there by somebody you knew, that you respected."

> "Well, again, I mean, patterns of practice that were taught by the professors and the staff men that you came in contact, I think, very much influenced me, and particularly staff people that I was impressed by, that thought were very good clinicians, and who I tended to emulate. And I really think that very much influenced, I think there is a great tendency to emulate respected physicians and colleagues."

> "A lot of the way I practice has still been from my professors that taught me in medical school. The ones who taught me on antibiotic use, the ones who taught me how to examine a belly, don't skip the rectal exam. I think a lot of that stuff is still there in the back of my mind."

> "First of all, this question...you have your training, whoever you are training with, that is what you follow for at least two year after you get out of school or program."

> "I think when you're doing your residency, you obviously do have to do a lot of reading, but I think what influences you even more than that is when you see

somebody who knows the literature, your preceptor, put it into practice. And you say, oh yeah, that's why it says that in the books, and that's why the literature says that, and they can maybe add a little bit other than the latest paper on why beta blockers are better."

Again, as with opinion leaders, the influence of specific individuals can be seen in the development and change of patterns of practice. This influence, at the training stage, is highly dependent on the location and setting of that training and the knowledge level of those mentors or role models. It appears that knowledge gained during training, however, stays with the individual physician, perhaps far longer than is recognized or appreciated. So those 'kernels' of knowledge that form the basis of patterns of practice for specific disease states are likely to be extremely difficult to dislodge or modify from the practicing physicians tacit knowledge base. Controversial or uncertain research that is presented may then be discounted even more easily, particularly given insights regarding who acts as opinion leaders for practicing physicians.

Experience also plays a large part in the development of physicians' patterns of practice, as might be expected. Some physicians pointed out that adverse experiences influence future decisions immensely:

"I think firstly personal experience. I mean, obviously, if I have an adverse experience with a particular drug, I'm not going to use that drug again, or I would use it very cautiously."

This may help to explain, in part, why the potential for adverse reactions to thrombolytic therapy seemed to be uppermost in many physicians' minds when examining the issue of whether to administer this drug therapy. However, generally, experience did not seem to be prevalent in the respondents' minds as influencing significantly their current practice patterns. This may be related, in some way, to the age or years of clinical experience of the physician. As one respondent pointed out:

> "At some point you hope that practice will be able to simply, you can cruise through, and then after you go through your middle years you begin to wind down in the last three or four years of your practice, you become less...the difficulty is once you come out of a box at a certain speed, everybody expects you to stay at that speed forever. And that speed is difficult to sustain."

> "I think, well, the truth about what happens in practice, I think I practice out of habit, number one. Now, how I picked up those habits very likely, probably depends on how old you are. The older you get, the more it depends on, I assume, on what you have probably done in the past. "

Perhaps this thought points to some inertia in physicians' behaviour and their ability to change, given how experience does seem to play a large role in the development of practice patterns and the likelihood that that type of knowledge is difficult to erase or change with traditional learning or teaching methods. There may be a hierarchy of knowledge gain, that is, knowledge gained by mentored or opinion leader experience is acted on more avidly than that from an itinerant CME, independent of the level of evidence available.

Other Influences

One very interesting note is the number of respondents who felt that their patterns of practice were, indeed, based upon what their peers did and that they did all practice the same.

> "Well there's a very small number of people that are actually involved in providing this kind of care. It's only the internists, and consequently there's not much dissemination to be required."

> "But I think most of us have pretty similar practice patterns when it comes to management of your major cardiac diagnoses. So in terms of how that affects individual practice, I think it's a variation on a theme. I think most of us apply the pretty current standards of practice."

> "So we all do much the same thing, as we all cover for each other. As far as possible, with minor differences, we all do much the very same thing. Whether that be wrong or right I don't know"

> "If you have a pattern of practice that works for you and you treat MI's the same way, and you're not really on the cutting edge of what's changing, then you can pretty much wait until it's become established practice or all of your peers have changed over and they're doing things that way."

This is regardless of information in the literature that suggests that, in fact, physicians are relatively unaware of how their colleagues practice, as they have little opportunity to participate or view such interactions. Furthermore, retrospective chart audit and fine measures of outcome, particularly based on age and/or sex, are not a routine occurrence in most of the respondents' settings, especially those in private practice settings, so this would not likely

provide physicians with such information. Chapter 2 suggests the opposite, in fact, that treatment variation is evident in many diagnoses and it is not attributable to differences in patient demographics or clinical variables such as acuity. The fact that the respondent physicians themselves seem to be unaware of this variation provides more evidence that those aspects of physician activities and training that influence practice patterns must be much more clearly understood in order to provide more consistent patient care.

Evidence of the influence of guidelines was inconclusive. Some respondents felt that guidelines provided the source of much of the justification for their current treatment decisions, while others suggested that, while guidelines had their place, experience and training would override guidelines if push came to shove. This reflects then, the variation found regarding the effectiveness of guidelines in changing physician behaviour and/or reducing variation. Physicians felt, particularly, if guidelines or specific treatment options were hospital policies that they themselves did not develop, or were contrary to their own beliefs regarding appropriate treatments, that they need not follow these guidelines unless they were inclined to do so.

> "I never take any notice of hospital policy."
>
> "Protocols are developed by the group."
>
> "I haven't found the practice guidelines very helpful. I think a lot of it is already really well known. Like the practice guidelines on some of the common things, that's already really well known."

While some respondents suggested that, on a case by case basis, patient demands or quality of life issues might influence their patterns of practice, generally it was observed that these types of issues were not reflected in day-to-day practice patterns. Respondents recognized an increasing level of knowledge of the patients and an increasing level of participation in treatment decisions, but no respondent suggested that practice patterns were altered on an ongoing basis due to patient preferences or participation.

The Differences in Treatment Patterns by Age and Sex

The final question of the interview informed the respondent of the available evidence of differences in treatment patterns for AMI on the basis of age and sex, and their reactions and opinions were sought. A small number of respondents rejected outright the existence of treatment differences and a few went on to suggest that they definitely did not treat their patients differently, regardless of age, sex, or any other variable.

> "In fact, I tend not to believe it. Now that's maybe too simple because I'm not looking at large scale populations. And with things the way they are now, people are always finding how one group is victimized in one way or another. I don't know whether I should attribute it to that or not, and I realize that's being a little close-minded. The patients that I see come in here, from my end of things, we don't differentiate really between the sexes."

> "I don't really believe what you're saying. It's not my or my colleagues' practice so somebody's practicing a little bit differently somewhere."

> "Right now that wouldn't be how I would practice because that's not what I understand to be the case."

"But between men and women, I don't see that. There's been enough stuff written that women aren't treated aggressively enough and that they do get the infarcts."

Denial of practice variation, based on sentiments such as those in the preceding quotes, or on the belief that the appropriate treatment of common diagnoses is common knowledge, make it unsurprising that such variation exists. This is not to suggest that these respondents may indeed show little variation in their treatment patterns based on age and sex, but it is not common practice for physicians, as was illustrated in Chapter 2, to actually practice in the manner in which they believe they do.

However, much more common was the recognition that such differences did exist. Overall, physicians seemed less reluctant to offer causes for the age differences in treatment patterns than for differences based on sex, although many suggestions were discussed for both areas of treatment differences. Several themes were established during these interviews in terms of the differences in treatments based on age. A few explanations or themes for the differences in treatments based on sex also emerged from the data. Respondents suggested that coronary diseases have, in the past, been presented as being a male problem, occurring much less often in females. As well, there is a perception that females with heart attack present much differently than males with heart attack and therefore the problem was one of diagnosis. This particular line of thought was expressed by many respondents, suggesting

that this is a topic that comes up in training. Both of these reasons, while suggesting that physicians don't think of AMI's as being something that occur for women, speak only indirectly to the issue of differences in treatment patterns.

> "Well, I think it's a real phenomenon. There's lots of data out there to suggest that women are not given the same consideration I think. I mean, for years, coronary disease was a disease of men and it still is."

Once the diagnosis is positively made, which did not present a problem for any of the respondents, issues related to diagnosis or presentation should have no bearing on treatment decisions. Other respondents suggested a wide variety of reasons related to a perceived higher prevalence of side effects, complications, and other diseases in women.

> "Women do have higher complications from procedures and from interventions, so women tend to have a little bit higher mortality from angioplasty and surgery. They have higher mortality post myocardial infarction and it's often because they're older when they present, they have concomitant risk factors like this woman did, so people shy away from them."

Such beliefs seem to confirm that there is a bias in the thought process in treating women with heart attack, which in turn, if it denies them proven, efficacious treatment, results in higher mortality still, creating a 'vicious circle' of cause and effect.

Many respondents recognized that most of the clinical trials to date have been conducted on men, and further, on younger men. As related by one respondent, this makes perfect sense for attempting to establish the efficacy and effectiveness of a therapy for AMI, however, it does also make extrapolation to

other patient populations more difficult and the outcomes of using such therapies less certain. This, then, seems to have introduced a very real bias in physicians decision-making processes for treating AMI, and quite likely other diseases, in which they argue that the trials data is clear for a particular sub-population with that diagnosis, but they feel uncomfortable extrapolating the improved endpoints to other sub-populations.

> "A lot of the big data that we have with respect to studies is on men. So, for example, cholesterol lowering data in primary prevention, up until just recently, the big studies were all with men. And the reason for that is that because men in the 40 to 60 year old range have 4 times the incidence of heart disease. So if you want to prove your therapy is better, you're not going to choose a low risk group of woman, where you have to spend 4 times as much cash. So just because the risk is lower, there was a perception that, okay, it works for men, but women are untested, so either it's not important or it doesn't work."

> "I've often though that it is because of a perception that medications aren't as well tolerated, or a willingness to consider something as a side effect that warranted discontinuation. And then, when that happens a few times, it becomes an expected side effect warranting not starting a medication, for example. I mean, it basically becomes a bias, that when you consider a clinical scenario, you expect certain outcomes, so therefore you start out with a different plan for management."

In terms of elderly patients, a much clearer bias came to light in the interview data. This bias took the form of the social worth of an older versus a younger patient, and the perceived cost/benefit, by the physician, of treating that elderly patient.

> "Yes, I think with the elderly, quality of life is very important. With the younger person you're going to do everything. If someone has a coronary at 40, you're going to look at that as being somewhat different in the way you manage it.

Because you're going to do everything you can to preserve his myocardium, to the best extent you possibly can. He's going to live for another 40 years. This old boy is not interested in preserving his myocardium, he doesn't really mind if he drops dead tomorrow, it's perfectly all right with him."

'The age one I can see. As you get older and older you become perhaps less aggressive."

"Now if you're treating a man with an MI or somebody with abdominal pain, the person who's going hurt us, a man in his 30's or 40's is going to hurt us. Because if we get it wrong, he's the guy, because they have testosterone, that's the way they deal with people that defy them, or that do them wrong."

"In terms of age, I think there's maybe a couple of reasons for that. I think that physicians are afraid that older people are more fragile. That older people are more likely to suffer adverse effects of drugs. I guess the other thing that clearly is an issue is physicians make qualitative decisions about whether it's worth the cost of the interventions in an older patient. And hopefully, most physicians are making that philosophical judgement based on quality of life and mental capacity, rather than age. I mean, I think it's appropriate to withhold aggressive treatment from a demented, bedridden 80 year old. It's not appropriate to withhold aggressive treatment from a functionally intact 80 year old."

The following quote seems to sum up what has been happening, the fact that many people recognize that it is happening, and their inability to be able to deal with the treatment differences in a clinical, methodical manner due to a very deep and unconscious bias that has implications for how patients' worth is judged and then factored into the treatment equation.

"We thrombolyse more men than women, at all ages. We thrombolyse them earlier. We give them beta-blockers more and earlier. We give them nitrates more

and earlier. We do more cardiograms on men. Why? I guess in the bottom of our brain, where we still think in terms of smell, and sound and light, we still think that heart disease is predominantly a man's, a male thing. It's okay if older people have it, but it's terrible if younger people have it."

In summary, physicians for the most part recognize that there are differences in treatment patterns occurring. However, explanations for these differences vary, with no distinguishable pattern based on specialty evident. There may, however, be a difference based on length of time in practice, as was illustrated in the questionnaire data. This comes from comments provided during the interviews that indicated how long the respondent had been in practice or the fact that it had been a long time since they were in medical school, residency or internship. It is not likely enough to sit back, however, and wait for younger clinicians behaviour to solve the problem, as it is apparent that these individuals are influenced by older physicians in a variety of ways. Differences in treatment based on sex were attributed to differences in incidence levels and presentation of the event, as well as the limited amount of clinical trials data available in which women were represented. And, relative to age, there appears to be much less open acceptance of the existence of a sex-based bias in treatment.

Treatment differences in the elderly were ascribed also to presentation differences, the influence of medication side effects, and the existence, often, of other diseases that had an impact on the management of an AMI for such a patient. However, there does appear to be a social bias regarding elderly

patients in which age is being used as a surrogate for the health and quality of life status of patients. That is, elderly patients are often thought of as being frail, sick and, paradoxically, based on the trials evidence, not really benefiting from aggressive treatment. The data also suggest that physicians make estimates of the perceived cost/benefit of treating patients, and that elderly patients are felt to benefit less, mostly because physicians determine that they have less time to live. Thus the cost/benefit equation seems to come out in favour of younger patients, and costly treatment may be withheld from more elderly patients as age becomes a surrogate measurement for number and quality of years left. As well, related to this cost/benefit assumption, physicians do not seem to place the same social value on the life of an elderly patient as they do on their younger counterparts. In terms of anticipated productivity and contribution to society, this may be, in dollar figures, an accurate description of reality. The question becomes, then, one of the appropriateness of the physician to determine that worth and to act on that determination in a way that may have a significant positive or negative outcome for that patient in terms of health status, longevity and quality of life.

The results of this interview data analysis reflect what Fox, Mazmanian, and Putman (1989) found in their study of 300 North American physicians. The majority of physicians interviewed for that study suggested that they learned from colleagues, reading, rounds and conferences or meetings. However, the evidence from this and other research suggests that physicians' self-reported preferences and activities do not contribute in many ways to producing and

sustaining meaningful clinical practice changes, as will be discussed in the next chapter. As well, there is indeed a treatment bias toward women and elderly patients, the source of which appears to be multi-faceted.

The questionnaire and interview data illustrate many of the same phenomena and are complementary in providing increased understanding of physician practice pattern decisions. The questionnaire data suggest treatment differences exist for AMI patients, even when a hypothetical patient case is presented to physicians for management decisions and for the verbal protocol analysis. This result is similar to much of the evidence reported in the medical literature. As well, age-based treatment differences were evident in the self-reported data as well as in the verbal protocol analysis. Sex-based differences were not observed in the questionnaire data but were alluded to in the questionnaire data, which is reflective of controversy in the literature as to the existence of such differences. Physician reports of factors influencing practice patterns confirm other, limited studies in this area. However, further investigation using the interview process reveal a much more complex, institutionally affected process in which coercive, mimetic and normative isomorphic mechanisms impel physicians to interpret information in different ways and to adopt different practice patterns in different ways, as will be discussed in the following chapter.

The questionnaire also revealed the difference in perceived treatment patterns by specialty of the treating physician. The data suggest the highest level of utilization for the proven efficacious drugs and lowest use level of non-proven drugs is exhibited by the cardiologists, followed by internists and then by the GP's. Other specialists usually fall closer to the GP's, however there is no consistent pattern for this group, nor would such a pattern be expected as this group of physicians is composed of a wide variety of specialists. This is an important result of this data, as these treatment patterns may logically be extended to goodness of outcome for the AMI population.

The third major theme was that significant differences in treatment were related to respondent experience, or total years of respondent in practice. As previously alluded to, evidence-based practice patterns appeared to worsen as years of practice experience increased. This may be attributed to any number of reasons, including difficulty in changing behaviour in later career stages, utilizing only experience-based practice patterns, or an inability, for whatever reason, to follow, and make behavioural changes, based on the current literature.

The final major finding of the data suggested that, when asked to provide a justification or reasons for prescribing or testing behaviour, the current literature outweighs any other stated factor influencing decision making. As suggested above, there are several potential issues with this result, given the existence of variance in patterns of treatment for AMI.

The interview data presents a complex snapshot of physicians' understanding of practice patterns and how they are developed and maintained, as well as more fully defining the isomorphic mechanisms that are at work within the institution. The interview data does illustrate that physicians believe that the 'current literature' is important and that it does define the best treatment options and the best outcomes that would be expected. The physicians appear to give much weight to the existence of scientific evidence that supports the use of a drug therapy, test or other intervention. However, the processes by which this information is translated, or does not get translated, or is imperfectly translated, are much more complex and are influenced to a great degree by isomorphic mechanisms as explained in the following chapter. The questionnaire and interview data reinforce the notion that variation exists and the causes of this variation are multiple and are relatively poorly understood, even by physicians themselves. The following discussion attempts to provide a clearer picture of the mechanisms at work in the institution which generate and maintain practice patterns, particularly those that influence the generation and maintenance of age and sex-based treatment differences.

CHAPTER 6: DISCUSSION

The Existence of AMI Treatment Differences

The original research question focussed on providing evidence that age and sex-based treatment differences exist in a wider range of physicians treating AMI's. The questionnaire data were indeed able to provide this evidence. While no sex-related treatment differences were evident, age related differences were found for thrombolytic and beta-blocker therapy, the use of serum lipid profiles, within 24 hours of admission, and the later use of exercise stress tests for risk assessment. The existence of age-based treatment differences in a self-reported study regarding intended practice patterns supports, very strongly, a general pervasiveness amongst physicians of the mechanisms discussed in the previous chapter. Or, expanding on the example of Kljakovic and McLeod (1997) from Chapter 2, who found that self-reported asthma management data were not an accurate reflection of how these patients were actually treated when the data were collected from patient charts, the fact that a large scale, self-reported practice pattern measurement did, indeed, demonstrate similar treatment differences found in retrospective and prospective chart audits, amplifies the need to better understand the mechanisms at work, especially since the treatment differences exist in a large and relatively distal institution of physicians. The mechanisms at work cross organizational and geographical boundaries and are very deep-seated in the institutional fabric.

The questionnaire findings corroborate the CQIN results, in general, the age-related treatment differences, and more specifically, that efficacious drug therapies are utilized less often in elderly patients. The difficulty of increasing the utilization of thrombolytic therapy for older patients has also been identified by Soumerai et al. in 1998. This study examined the effect of local medical opinion leaders on the quality of care for AMI employing a randomized clinical trail. The results of the trial indicated that it is difficult to increase the utilization of what are termed effective but riskier treatments, like thrombolytic therapy, in patients that are perceived to be frail, that is, usually the elderly patients. Even earlier than this, it was recognized that the utilization rates of thrombolytic therapy differed across various patient groups. Gurwitz et al., 1996, found in a large study of AMI patients that older patients less commonly received this particular therapy, even when the likelihood for receiving the treatment was adjusted for potentially confounding factors such as sex, initial diagnosis method, and time to presentation. This suggests that the treatment differences cannot be completely explained by ineligibility of older patients using conventional clinical eligibility criteria. The Gurwitz study was a follow up on an earlier publication, which suggested that the risk of in-hospital death following an AMI was higher for elderly patients, and, while the risk was decreasing for younger patients, no such improvement was found to be occurring for the older patient cohort. The obvious inference being that the lesser utilization rates for the efficacious therapies might be causative to some degree for the higher risk of these patients(Gurwitz et al., 1994).

Similar studies have taken place regarding the utilization of beta-blockers and the differences in utilization rates based on age were recognized some time ago. Gurwitz et al. (1992) found a consistent decreased use of beta-blocker in older patients, even after adjustment for demographic and clinical variables such as sex, history of angina, hypertension, diabetes mellitus and other clinical variables.

With respect to risk prediction tests, Gurwitz et al, in a 1991 study examining the use of several types of cardiac testing including ECG Holter monitoring, echocardiograms and exercise stress tests, found that patients aged 65 years and older were significantly less likely to undergo exercise testing than were patients less than 65 years of age.

These previous studies further support the fact that practice pattern differences do exist in the treatment of AMI patients, and, in fact, these differences have been evident for approximately a decade, and not solely due to the existence of co-morbidities in sub-groups of patients. As Fitzgerald and Ferlie (1998) found, the existence of evidence supporting a particular therapy may not advance the use of that therapy to the degree that physicians believe. Indeed, their research suggested a weak relationship between the strength of the evidence base and the adoption of a new advancement. While one might argue that the evidence for aspirin, for example, is indisputable and utilization has increased substantially over the past decade, not all physicians are comfortable prescribing aspirin to very elderly patients, even in the absence of any

contraindications. For AMI, it has been found that even with the publication of large randomized clinical trials, there is a variable impact on medication use (Col et al., 1996). All the proven, efficacious drugs have concordant, indisputable evidence that strongly suggests their use decreases mortality in AMI, and further, that in higher risk patients, the benefit is greater. This evidence, then, would suggest that such treatments would be utilized at least equally in all sub-groups of patients, but the evidence illustrates this is not the case. The question remains, then, why this homogeneous pattern of utilization exists, and is allowed to exist, in the face of evidence that shows it to be a less effective method of treating AMI's, producing population survival outcomes for AMI management that are sub-optimal.

It is tempting to put these treatment differences down to the difference in perceived treatment patterns by specialty of the treating physician, as outlined in the previous chapter. This has been the focus by Jollis et al. (1996), in a study that investigated the outcome of AMI according to the specialty of the admitting physician. This study looked at the clinical impact of shifting health care costs away from specialists to primary care physicians. The research examined the mortality of a large sample of Medicare patients hospitalized for AMI, and adjusting for characteristics of patients and hospitals, patients that had a cardiologists as an admitting physician were 12 percent less likely to die than those admitted by a primary care physician. As well, as found in the current survey, cardiologists had the highest rate of utilization of drug therapies

associated with improved survival. Friedmann, Brett and Mayo-Smith (1996) also found, using a mail survey, that cardiologists were able to provide more accurate estimates of risk and of therapeutic benefit than were family physicians or general internists. However, these results do not provide the information necessary to illuminate why such specialty-based differences occur. It is tempting to suggest that 'better' continuing medical education would alleviate or correct these differences, both in treatment and outcomes, but further investigation reveals that this may not necessarily be the case. The difference in utilization rates by specialty has implications for a number of related issues regarding how physicians are organized, and how they are educated, including continuing education content and implementation. As well, there are issues surrounding policy decisions regarding staffing patterns and the use of specialists versus generalists, particularly in areas where patients are in acute situations or are being treated for multiple diseases, for which risks and contraindications are significant.

Similarly, treatment differences could be explained by suggesting, as is illustrated in the questionnaire data, that these differences are related to respondent experience, or total years in practice. However, evidence-based practice patterns appeared to worsen as years of practice experience increased. Thus, there appears to be no simple answer to the complex relationships among education, training, and the professional structure of the institution of physicians. The inter-group differences are, however, dramatic and could potentially provide

an important clue regarding how practice patterns change over the career of a physician and what influences are most important at each of these stages.

Further analysis examined whether the age-based treatment differences existed when the data were separated into categories based on experience. This analysis demonstrated that years of practice of the respondent did not abrogate differences in treatment patterns based on patient age. That is, experience did not modify the apparent age bias of treatment. It exists across all categories of physician experience.

And, the final major finding of the questionnaire data suggested that, when asked to provide a justification or reasons for prescribing or testing behaviour, the current literature outweighs any other stated factor influencing decision making. If this were truly the case, the existence of treatment differences and the existence of appropriate treatment alternatives as outlined in the literature seem irreconcilable. There are obviously other issues within the institution that influence this category of the current literature, that result in the treatment differences for AMI. These three aforementioned questionnaire results are important in providing direction and definition to the examination of the isomorphic mechanisms that contribute to practice patterns generation and maintenance.

Generation and Maintenance of Physician Practice Patterns

The second research question related to the identification of the isomorphic mechanisms that influence the institutionalization of treatment and prescribing patterns in AMI. With the completion of Phase I of the research, the question remained as to how specific practice patterns are generated and maintained, even in the face of evidence that they are inconsistent with what current medical evidence suggests are proven efficacious therapies. Institutional theory suggests isomorphic mechanisms propel organizations to be similar, and with the age-based treatment differences evident in AMI, it is necessary to determine what type of mechanisms are acting upon the institution of physicians that propel them toward such homogeneity of treatment, even when such treatment is not clinically warranted, and, in fact, the evidence would point to it being inappropriate.

The results, when further interpreted through the institutional theory lens, identified the existence of all three types of isomorphic mechanisms in the generation and persistence of patterns of practice.

Coercive Isomorphism

Coercive isomorphism has been described as pressures, either formal or informal, to conform. Such pressures do, in fact, exist in the institution examined in the research. The pressure to conform to specific practice patterns comes in various forms. Utilizing Fogarty's (1992) framework it can be seen that there are few, if any, economic forces that would impel physicians to practice in a certain

manner. This is due to the lack of connection between performance and remuneration for physicians. Physicians' performance is not measured to any standard and is not generally tied to patient outcomes except perhaps on a global level, such as those utilized for standard of living comparisons. As previously argued, neither clinical or basic research funding is connected or compared to 'optimal' practice patterns for any diagnosis, either at the institutional or individual level. Rather, performance standards are institutionalized to a large degree and measured by the absence of patient complaints to regulatory bodies and physicians are paid utilizing a provincially determined, pre-set schedule of fee-for-service. Thus, activities regarding patterns of practice knowledge or measurement have no relation to remuneration. Even in an academic setting, which might be thought to utilize stricter or more transparent performance measures, remuneration is usually based on levels of clinical, research, teaching and administrative activity levels rather than patient outcomes.

Guidelines can be construed to have a coercive influence on physician behaviour, particularly those guidelines that are introduced and disseminated as 'national consensus' guidelines. These would indicate to the practicing physician that this is a currently and commonly accepted manner with which to deal with patients having specific diagnoses, put forth by experts in the field and therefore is a legitimate, in fact preferred method of managing patient populations. There appears to be some level of this type of coercive mechanism

at work specifically for those physicians that one, read more general literature that publish consensus guidelines, and two, purport to utilize such guidelines. The evidence seems, however, clear that such national or provincial guidelines are less well accepted than locally produced guidelines, and thus the potential coercive influence is markedly diminished. Locally produced guidelines may also have a coercive influence in terms of shaping physician behaviour, but it is likely the normative influence is much greater in this case, bringing to the fore the power of the local dominant coalition, on a large or small scale.

As Tolbert and Zucker (1983) and Rowan (1983) argue, technical factors may be important in the adoption of innovation in the early stages, and non-technical factors may influence later adopters. If, for example, a group of cardiologists saw a technical need for guidelines to improve practice and outcomes, later adopters, not privy to the specific technical value of these innovations, may not have the required knowledge that would incite them to take up the innovation. Without this knowledge, institutional factors likely play a larger role in the uptake (or not) of guidelines and the role they play in practice pattern alteration. The perceived dominant coalition (in this case, cardiologists) may exert normative pressures for guideline adoption, however, these pressures do not translate into understanding or create champions, which results in variable adoptions rates as well as outright rejection of this tool.

Opinion leaders, specifically specialty physicians, may also be thought to produce behaviour change in their colleagues through the use of traditional

CME's, consultations, and activities such as grand rounds. However, the research results suggest that because individual physicians are likely to choose their opinion leaders, such coercive attempts would fall short. As well, opinion leaders appear to reflect normative and mimetic activities within the institution which carry more weight in terms of forming and changing physician practice behaviour rather than from any sense that they carry the 'only truth' or have a knowledge or wisdom unavailable elsewhere.

Finally, it might be anticipated that the need for legitimacy would be a significant mechanism in determining widely utilized practice patterns. Physicians would want to be seen as legitimate entities by other, perhaps more powerful or dominant individuals and/or coalitions. However, while there may be some level of this quest for legitimacy that acts coercively on physician behaviour, across the institution it is unlikely to have a major affect because specific practice pattern behaviour has no legitimacy basis. That is, the political nature of the literature and body of evidence, as well as differences with respect to choices of opinion leaders, result in a distinct lack of legitimacy seeking behaviour, again, in terms of practice patterns. There are other types of behaviour, perhaps, within the institution that could be described as being influenced by the need for legitimacy that assists in institutional survival and prosperity, however, practice pattern behaviour is not one of those.

In general, coercive isomorphism suggests that specific activities and policies are enacted to put pressure on individuals and groups of actors within the

institution in an attempt to drive them toward certain institutional goals. While this may indeed occur in the institution of physicians for many other types of activities, it is clear that coercive isomorphism has a much lesser influence than that of normative or mimetic isomorphism. This may be seen in the beginnings of change and perhaps the deinstitutionalization of the separation of outcomes from clinical activities as the systematic examination of evidence-based health care continues to evolve. As restructuring increases the role of administration in measuring physicians' performance and outcomes, we may see an increase in the attempted use of coercive mechanisms to elicit specific behavioural changes. In a time of dramatically reduced funding for health care, ties between behaviour and performance are much more likely to be studied and any performance crisis and the existence of conflicting internal interests (Oliver, 1992) that emerge will play a role in the deinstitutionalization of this normative separation. However, it appears that physicians are already rallying to remain dominant and retain their autonomy, regardless of the arguments put forth by administrators, through the production of their own consensus guidelines, which may or may not, however, be based on good information and produce the improved patient outcomes expected from clinical trials data.

What may arise to increase any existing, and enable new, coercive mechanisms to alter physician behaviour is the continued, and greatly increased, dissemination of the consequence of practice variation. As Oliver (1992) noted, "dissonant information or unexpected, irrefutable events in the organization's

environment often emerge to discredit or challenge the utility of the operating assumptions of organizations. Although these events and data may be idiosyncratic, non-repetitive and unpredictable, their consequences may be profound in term of deinstitutionalizing existing beliefs and activities" (574). Only if physicians, it would seem, deem the current situation unacceptable due to the prevalence of practice variation data and its effects, would stronger coercive mechanisms become prevalent. Physicians are concerned, in fact have a professional norm, that clinical activity should first do no harm. Thus, if current activity is perceived to be resulting in harm, perhaps the efforts and the influence of experts and guidelines would become more focussed in ways that put pressure on physicians to master practice patterns that reflect the promise of clinical trials results in terms of patient outcomes.

There are structural features of the institution (and the individual organizations therewith) of physicians which may influence practice patterns behaviour to a degree. While traditional structural variables such as size and formalization do influence physicians' behaviour, it is difficult to determine to what extent these types of variables specifically affect patterns of practice and attempt to impose change from the outside. Because the notion of autonomy is so strong in this arena, these types of traditional structural variables are likely not as strongly influencing the practice pattern behaviour. The institutionalization of a medical institution which recognizes generalists, specialists and sub-specialists introduces conceptions of status, and certainly differences in training, and which

groups are the dominant coalitions, do arise, however, such variables appear to influence other factors such as acceptable contributions to research, teaching and administrative duties in academic settings, levels of clinical activity in academic and private practice, and activities that must be pursued to maintain membership in the institution, rather than the content of practice or related themes. Certainly the structure of the institution contributes to the explanation regarding mimetic and normative mechanisms that follows, but concrete structural factors that influence practice patterns are less apparent.

The interview data suggest it may not be possible to attribute causal relationships to specific types of mechanisms, and in fact, a mechanism originally identified as coercive may alter over time to become a normative mechanism. For example, guidelines may have been instituted initially in some organizations as a purely technical response to practice pattern variation. Such responses to technical problems in one organization may be seen to enable other organizations to become, or be seen to be, legitimate. Thus, such mechanisms are coercive in the sense that they become necessary to provide a sense of legitimacy across the institution. This then begs the question of response to such a mechanism. Some organizations may indeed fully respond to the coercive mechanism and implement guidelines fully. Other organizations may implement guidelines only to the extent necessary to be seen to be legitimate, while organizational members recognize the limited implementation of such interventions and their behaviour is not influenced to a great degree by

such interventions. As well, mechanisms may be felt differently by different institutional members. This may be based on personal perceptions or on normative understandings of how things are done. For example, a sub-specialist such as a cardiologist, may perceive guidelines to be a normative type of mechanism, an accepted manner in which to practice, while other specialists might perceive the adoption of a guideline as a coercive mechanism that is put in place to constrain and direct their behaviour. Subsequently, guidelines may become, over time and geography, a normative mechanism, viewed by these same institutional members as a valuable professional activity and practice that is necessary to carry out the role of physician in the proper manner. Coercive mechanisms, then, require a thorough examination in order to determine the breadth and depth of their influence on the institution.

Mimetic and Normative Isomorphism

The evidence of the influence of mimetic and normative isomorphism in shaping and maintaining physician practice patterns is much greater. Mimetic isomorphism occurs due to imitation in the presence of uncertainty or when goals are not clearly understood, while normative isomorphism plays out thorough the process of formal education and legitimation required for institutional actors and via the span of activities accepted as being part of the professional institution of physicians. As outlined by several authors including Mizruchi and Fein (1999), it is often difficult to accurately or completely separate

mimetic and normative influences. Therefore, they will be discussed together in order to fully appreciate the nuances that are apparent in the data.

As suggested by Fogarty (1992) mimetic mechanisms can be viewed as arising from modeling, mentorship and/or diffusion. Practice pattern behaviour has elements of all three of these influences within the institution. Beginning with a student's training, modeling in an integral element in the learning process. And as previously argued, such modeling occurs in every facet of the educational process, from medical school, to residency and through internship and on into clinical practice. What is less clearly identified as mimetic behaviour is the extent to which individual's model 'ideal type' behaviour in terms of practice patterns. It appears that early understandings of effective treatment remain as working models of appropriate patterns for long periods of time. Such practice pattern behaviour may indeed be passed on to the physician through role modeling of higher status and more knowledgeable individuals, but it is equally apparent that these physicians choose the modeller based on acquired professional norms that allow them to understand the information and then make a determination of whether the role model is aligned with their burgeoning normative conceptions of the field. However, there definitely is an element of modeling in which the physician observes what is believed to be an appropriate practice pattern for a diagnosis, and also utilizes ideas gained during the socialization process regarding how such models fit with all other norms, values and beliefs, particularly as they relate to norms around performance.

As clinical experience increases, physicians look less and less to role models, and, indeed, have less opportunity to observe others in clinical practice, because the level of uncertainty declines and the goal, for the individual physician, becomes clearer. Again, however, normative mechanisms intercede in helping define these goals, and while there is no doubt that physicians want to do the 'right thing', normative prescriptions regarding how physicians practice and what is important necessarily influence the definition and prioritization of these goals.

Physicians seem to believe that, on average, their training has a much smaller influence than does their experience and their knowledge of the literature. In contrast, however, there are indications that their formal training provides a very strong and enduring base for some aspects of treatment patterns which remain within the tacit memory of the physician (and perhaps become habit) and influence greatly the management choices they continue to make (Anderson, Wheeler, and Goldberg, 1991; Evans, Haynes, Gilbert et al., 1984). Perhaps more importantly, however, this training provides physicians with a set of values and beliefs, transferred from teacher to student, through a myriad of experiences and repetition that contributes to practice patterns in significant and, heretofore, misunderstood ways. Training really begins with medical school and proceeds through a rigid and rigorous path that teaches the basic mechanisms of disease and pathophysiology, as well as acquiring skills such as how to take proper patient histories, conduct physical examinations, and utilize diagnostic testing

and prescribe treatment. Clinical experience hones these skills through repetition and all the experiences that result because of this work. The transference of knowledge, skills, as well as values, norms and beliefs are complex because it is not only related to the actual information being transferred, but also to the person transferring the information. Students are exposed to a wide range of behaviour, values and beliefs, of which they appear to pick and choose in order to combine these elements into their own management patterns and norms within the profession. And, similar to the choice of opinion leaders, it is expected that the choice of mentors, or other individuals that have some influence during the training process (such as professors, preceptors, and the like), are chosen based on a variety of attributes.

One of the most obvious roles that modeling plays in forming and maintaining practice patterns is the notion that it reduces uncertainty and the occurrence of adverse events. This likely plays a very large role in the formative training at each stage of a physician's education, when new information is being utilized in clinical practice, as well as when practicing physicians are dealing with new clinical situations and are utilizing opinion leaders as role models. However, it is here the blurring of mimetic and normative mechanisms occurs. Opinion leaders are chosen based on many factors, the least of which seems to be the perception that they are able to impart the best answer. As well, the recipient of this information is usually unable to actually observe the individual in a clinical situation, so role modeling is perhaps not the proper conception for this type of

activity. This may be better termed the influence of mentor relations, however, even this may overstep the actual relationship that opinion leaders have with individual and groups of physicians. While certainly respondents alluded to there being a role for mentors in shaping their career choices, it was less apparent that mentors influenced, to a greater degree than opinion leaders, patterns of practice. Mentors traditionally provide more guidance in terms of helping the individual being mentored in understanding roles within the institution and providing information regarding career development, removing obstacles or barriers that impinge on the success of the individual, and providing support and encouragement (Fogarty, 1992).

It would also be expected that the diffusion of information would provide a powerful mimetic mechanism that would influence patterns of practice to a great degree. Referring to the discussion in the previous paragraphs, however, it is apparent that the diffusion of practice pattern information, specifically from large randomized clinical trials and other 'valid' research, intended to alter and improve patterns of practice for individual diagnoses falls extremely short of the mark. Here again it appears that normative mechanisms impinge on this mimetic mechanism, rendering it ineffective as a method of institutionalizing patterns of practice. So, physicians appear to give much weight to the existence of scientific evidence that supports the use of a drug therapy, test or other intervention. However, as Fitzgerald and Ferlie (1998) suggest, many organizational and

behavioural factors intercede in the institution which shape which literature is read, how it is read, and who does the reading.

Reference to the literature can mean many different things to different individual physicians. In the broadest and most literal sense, it is likely that the term 'the literature' is used to mean that specific literature that forms the basis of information for that medical specialty or sub-specialty. Cardiologists read cardiology journals, and rarely, it would seem, read outside this specialty literature. They do not appear to take much notice of information that comes from more general sources, including from provincial or national regulatory or professional bodies. Other specialties, the internists or general practitioners, also read within their own specialty, but demonstrated more willingness to include more general sources of information in their knowledge base. It was not clear, then, that these three groups, all treating AMI's, were actually reading the same information in terms of its content.

Galaskiewicz (1985) suggests that while it has been assumed that professional networks provide equal and free access to information to all members of the institution, the author also recognizes "that these networks are not free from bias, and that, typically, members of a profession do not have free and equal access to one another" (639). This is evidenced in the unequal access, likely through normative mechanisms, to written literature, but also through access to so-called experts in the field or cutting-edge research, which results in "clustering in scientific networks (that is) based on the prestige and productivity

of researchers" (640). This plays out particularly in the opinion leader choices of members of the institution.

Each group tended to recognize, and give credence to, opinion leaders in the literature within their own specialty. This is likely due to institutional "norms of rationality which emphasize minimizing uncertainty in transactions and relationships" (Galaskeiwicz, 1985: 640). The consistency in terms of practice pattern information, however, of each of these sources is called into question, thus perhaps explaining, in part, how practice pattern variation comes about. While no definitive judgement can be made at this point, however, it might be hypothesized that there is a lack of consistency across specialties regarding what information is being disseminated for each of these sources. While Galaskiewicz (1985) notes that "physicians who were more active in specialty medical societies were more likely to be early adopters of new drugs" (641), the author goes on to suggest that those that worked in a context of greater uncertainty determined what was the 'correct' method by "checking their standards and beliefs against those of fellow group members" (641). Thus, it can be seen how normative mechanisms work to create varying levels of adherence to proven, efficacious therapies.

Reference to the literature also meant, in many cases, information that the physician believed to come from the literature because an opinion leader had provided that information, and it was assumed that such an individual would be well aware of current literature and be giving the physician the response that the

literature deemed correct. In practice, however, opinion leaders for internists and general practitioners tended to be those individuals that were locally or regionally recognized as being able to answer their questions. This is similar to Galaskiewicz's (1985) finding regarding his study of corporate giving officers, who were more likely to turn to individuals within their network whom they perceived as having better knowledge and higher status, rather than turning to another like individual. The choice of opinion leaders for certain areas of clinical treatment appear not be based on publications or recognition due to stellar clinical practice, but rather based on availability, tradition, alignment in terms of philosophy and current practice regimes, and a structure of high status and lower status positions within the institution. In rural areas, physicians relied on the closest 'expert' to assist them in dealing with particular cases. The effect of this is the dissemination of that opinion leader's patterns of practice for that diagnosis, which may be based on many factors other than, or in addition to, their knowledge of the current literature and its application for specific diagnoses. As Thomson, Oxman, Haynes et al (1997) discovered, local opinion leaders are effective in disseminating information, as also found in this research. However, the effectiveness of opinion leaders has also been found to be inconclusive (Thomson, Oxman, Hayes et al), suggesting that this role is complex and poorly understood. It must be noted that this research attempted to find improvements in practice patterns based on opinion leader intervention, without investigating any other factors influencing physicians' behaviour. It can be concluded that the role of the physician-chosen opinion leader is a significant

factor in assisting other groups of physicians to understand the state of the literature, affecting patterns of practice. Thus, the role of the opinion leader overlaps substantially with any physicians' understanding of the literature, as well as their interpretation of the literature. This follows Fitzgerald and Ferlie's (1998) second finding that "scientific evidence is in part a social construction as well as 'objective' data" (10). While this may be no surprise to organizational and social theorists, it is likely a tremendous leap for scientists in the medical field. Many physicians refer to the 'body of evidence' as if this were an actual tangible entity that they can point to as justification for their actions and decisions, that it is, in fact, 'the truth' regarding the identification of appropriate or inappropriate actions. It seems clear from the interview data, and confirming Fitzgerald and Ferlie's assertion, that there are actually 'bodies of evidence' that compete within each specialty and across the institution of physicians. This is a very important notion in the context of multiple specialists treating a disease state or specific diagnosis, particularly as these bodies of evidence occur because of the many relationships physicians have with their specialty associations, with funding entities such as pharmaceuticals, and with academic centres, all of which have some investment in, or competition for, what the research agenda will be and how the results of such research will enter the institution.

As well, and perhaps more importantly in the context of multiple specialists treating a disease state, "there is no such entity as 'the body of evidence' but

rather competing bodies of evidence available to support almost any position" (Fitzgerald and Ferlie, 1996: 10). This makes it extremely difficult to achieve the goal recognized by physicians that "doctors always seek to base their decisions on the best available evidence." (Rosenberg and Sackett, 1996: 212). Fitzgerald and Ferlie (1996) argue that both individuals and groups accept different forms of scientific evidence to varying degrees, so evidence across specialties may have varying levels of credibility in terms of research design. Randomized, controlled clinical trials may represent the epitome of valid and credible research for some groups of physicians. This is akin to the assertion that "the professions in particular tend to gain legitimacy by affiliating their efforts with the widely revered social values of rationality, efficiency and science" (Carpenter and Dirsmith, 1992: 42). Clinical trials, then, may be said to represent the most widely accepted form of truth-seeking behaviour. However, there are other groups that are accepting of methods of investigation that might be perceived as less rigorous. This will have some impact on the information that is disseminated across the various specialties. This may also help to explain Fitzgerald and Ferlie's (1999) finding that "the 'world' of meta analysis remains divorced from the world of clinical practice, and that knowledge may flow poorly between the two groups" (9). Meta analysis falls short of randomized, controlled clinical trials in some physician groups' view with respect to the 'correct' method of answering the substantive and current issues, particularly in cardiology.

Ultimately, it is recognized via this research that practice patterns have both a technical and an institutionalized component, with the institutionalized component appearing to render altering practice patterns remarkably difficult, more so, it is suspected, than if they were more heavily influenced by the technical aspects associated with them.

This has implications for how much weight is given to the available evidence by different physician groups and specialties, and also may help to illuminate why significant treatment differences exist for the different physician groups that treat AMI's. As Fitzgerald and Ferlie (1999) argue, the fact that there is such a social construction component, in addition to an objective data component, makes the choice and interpretation of the literature open to dispute amongst physicians. Such disputes can cause much uncertainty in the medical community, particularly for those outside the sub-specialties and the active research area. This uncertainty will undoubtedly decrease the adoption rate of new discoveries and better treatments by the bulk of physicians who are unable, or unwilling, to draw their own conclusion about the available literature. An example in the treatment of AMI is the use of calcium channel blockers. While utilization rates have decreased over the past decade, due to the recognition that this therapy does not benefit AMI patients, and may be detrimental, there are still many proponents of this therapy in the AMI setting. Again, reliance on the validity of specific types of clinical studies and opinion leaders has created a chasm between the proponents on all sides of the argument. Kizer, Cannon, McCabe

et al. (1999) found that physicians involved in the design and/or implementation of a clinical trial were much more likely to translate the results of such trials into their routine clinical practices. This is evident in the overall treatment differences illustrated by cardiologists and other physicians (see also Philbin, Weil, Erb et al, 1999). Many cardiologists practice in academic settings and are involved, to a greater or lesser extent, in randomized clinical trials. It should not be surprising, then, that this group is better able to identify specific results and make practice changes based upon those results. This may also be an issue of age of the physician (Millat, Fingerhut, Flamant, et al., 1999), in which older physicians are not as well acquainted, on average, with clinical trials and thus, opinion leaders are more influential in forming their practice patterns.

As well, even with the existence of clinical trials that appear to answer important clinical questions, methodologies utilized for such research may also influence the acceptance of such research. Exclusions in clinical trials, such as sex and age-based exclusions, appear to contribute to the inability of physicians to generalize the findings to the whole patient population. The age-based exclusions in AMI research, thus, have contributed to the limitation of real-world treatment options in the patient population with the highest morbidity and mortality (Gurwitz, Col and Avorn, 1992). This pattern trickles down, from the academic centres where the research originally occurs, to other specialties and then community-based general practitioners, where, similar to the case of corporate giving officers, physicians turn to those in their network whom they

perceive to have better knowledge and higher status (Galaskiewicz, 1985). And, as recognized by Fitzgerald and Ferlie (1998) as well as the interview respondents in this research, the notion of evidence-based medicine is not a cure all for any aspect of practice pattern variation.

> "One of my problems with those who are complete proponents of evidence-based medicine is the fact that clinical trials, when we look at the type of patients randomized in clinical trials, really only represent a small fraction, we're lucky if it represents 10% of the patients, with the condition that we actually treat on the whole, and therefore we have to extrapolate that."

So while guidelines are one tool that medicine has attempted to utilize in order to propagate the 'body of evidence', this too has fallen short of expectations as Burns and Wholey (1993) found with the spread of unit management across hospitals, guideline adoption has indeed been influenced by mimetic forces. The structure of the institution can and did readily diffuse the inspiration of guidelines. As Scott (1990) noted, "being embedded in a network of social relations can bring one news of innovations, support for adoption, helpful hints regarding implementation, and social support encouraging change. Such processes clearly operate among professionals across organizations" (1990: 184) (in Burns and Wholey, 1993: 112). However, it does appear that normative mechanisms, such as physicians' autonomy and specialist barriers, have hijacked the guideline imperative from one of decreased practice variation to be imitated, particularly in cases of uncertainty. So while mimetic forces do influence the adoption of guidelines and other tools that simulate guidelines, the rationale for such adoption has been overtaken and lost in the dissemination

due to competitive normative forces that inhibit flows of knowledge and interaction between groups. Groups within the institution may adopt guidelines as a method of practice in order to appear legitimate, that is, for non-technical reasons, thus the technical advantage of guidelines is lost (Burns and Wholey, 1993). The technical reasons become subverted by controversy and disagreements within 'the literature' and between experts in both the dominant and other groups, by failures to achieve alignment with patterns of practice by a majority of institutional actors, and by failing to subsume patterns based on training and experience.

Problems of design are only the beginning of the long road that evidence-based medicine faces in attempting to provide appropriate care to patient populations. The evidence-base, even if it exists, is beset by many stakeholders, both proponents and nay sayers, as well as a large group of physicians who appear to be indifferent to the existence of such an evidence base. As well, there are concerns that the use of evidence-based medicine is a cookbook approach to the practice of medicine (Haynes, Sackett, Gray et al, 1996) and this impinges on the professional value of autonomy for some physicians, since it is recognized that autonomy, the freedom to exercise judgement and discretion, characterizes professional work (Galaskiewicz, 1985). And, confirmed by other research (Haynes, Sacket, Gray et al, 1996), many physicians feel that they are already utilizing the evidence-base as the base for their practice decisions. Given that evidence-based medicine has been defined as "the conscientious

and judicious use of current best evidence from clinical care research in the management of individual patients" (Sackett, Rosenberg, Gray et all, 1996: 71), and if the evidence-base itself is in dispute to the level that this, and other, studies suggest, the widespread application of evidence-based medicine will be an extremely complex process.

The literature, and issues surrounding the literature that have been previously discussed, are many and varied and this is one of the ways in which the diffusion of information is intercepted and rendered unproductive. Normative, it must be remembered, refers to the observation and active acceptance and practice of the norms of the profession. These norms are developed, as DiMaggio and Powell (1983) so fittingly suggest, first, because of "the resting of formal education and of legitimation in a cognitive base produced by university specialists" (152). So training and continual socialization by way of professional associations, particularly specialist associations, provide a most comprehensive set of norms for both the neophyte medical student and the most seasoned clinical and/or academic specialized physician. This professional network structure also contributes to an "exchange of information among professionals helps contribute to a commonly recognized hierarchy of status, of center and periphery, that becomes a matrix for information flows" (DiMaggio and Powell, 1983: 153).

One of the main methods of obtaining information in this network is through the formal continuing medical education (CME) which all physicians take part in to a greater or lesser degree. While it might be assumed that CME provides a forum

in which all three isomorphic mechanisms would influence practice pattern behaviour, the actual influence of CME is in question, and seems to be mostly a normative mechanism which functions to reinforce the professional norms and values that are evident in the institution. Conclusions regarding the influence of CME are somewhat more nebulous due to the number of activities that constitute CME. There are, however, conclusions that can be drawn from the data and other research in this area. CME is an ingrained professional activity at all levels of physician activity. Physicians must take part in a prescribed number of hours of CME in order to maintain their licenses to practice and meet the requirements of the provincial and professional associations to which they belong. However, it appears the physicians themselves are not in the position to reliably and consistently identify the areas in which they are deficient or require updating of skills and knowledge, based on the overview of practice pattern variation previously provided and also suggested by other studies such as Fox, Mazmanian, and Putman (1989). This research asked 300 physicians what learning resources they utilized to make clinical changes to their practice. As in this research, the data revealed that physicians believed they learned mostly from colleagues, reading, rounds and conferences. These activities, with the exclusion of discussions with colleagues, represent CME activities. It is interesting to note that in a decade of research in the medical literature that illustrates the ineffectiveness, on average, of these methods, the physicians' perceptions of how they learn have not altered. Some perceived barriers to incorporating new knowledge or skills provided by CME include time pressures

in clinical practice which preclude the detection, appraisal and assimilation of current evidence, mismatches between evidence and clinical circumstances (for example, risk prediction helps to stratify patients and make decisions about the patients' future management, however, many small centres do not have access to the risk prediction test facilities that are required to carry out such investigations) and difficulties in learning new clinical skills (Haynes, Sackett, Guyatt et al., 1997). It is these barriers that influence the effectiveness of the majority of CME efforts in which physicians take part. Studies have demonstrated that mailed information and educational materials or didactic continuing education such as dinner meetings with speakers or widely used conference settings are relatively ineffective in changing patterns of practice or, subsequently, patient outcomes (Haynes, Sackett, Guyatt et al., 1998; Freemantle, Harvey, Grimshaw et al., 1997; Davis, Thomson, Oxman et al, 1995). Additionally, even when practice improvements were noted, they often have been found to be short-term, suggesting that physicians may return to prior practice patterns that are likely influenced by previous training (Evan, Haynes, Birkett et al, 1986). This suggests that interactive type educational sessions may be a better method of influencing physician behaviour, as noted by several of the physicians interviewed. This may overcome the illusion that many physicians have that they already practice utilizing the best evidence-base available, thus, continuing medical education sessions are not warranted (Stross, 1999). As expressed by Davis (1993), the dissonance is great between the CME activities that physicians prefer for keeping up to date and those that

have been tested and shown to work." (A-18). Physicians, regardless of their perceptions about their own practice patterns, are slow to incorporate new, proven practices (such as thrombolytics and beta-blockers) and slow to shed those practices that have been conclusively shown to be ineffective or even harmful (such as calcium channel blockers).

In terms of practice patterns then, it can be seen that while initially training provides the basis for the development of specific patterns, ideas of the importance of physician autonomy, their interpretation of the value of 'the literature', the endorsement of the politicization of that same literature, and status and knowledge conceptions regarding various groups of physicians, influence to an immense degree what practice patterns are formed for different groups of physicians.

The Influence of Isomorphic Mechanisms on Treatment Differences in AMI

The above discussion informs us, to a great degree, how the age-based treatment differences illustrated in the questionnaire data, and the potential sex-based differences alluded to in the interview data and in the medical literature, are maintained, and also to some degree, how they are generated It appears that there are both mimetic and normative mechanisms that influence the generation and maintenance of these treatment differences. As the data and literature conclude, medical training and research provide a stereotype patient that is young, male and likely white (see for example, Schulman, Berlin, Harless

et al, 1999 or Mehta, Wilcox and Schulman, 1999) which informs physicians how to treat that population of patients, while viewing other populations as abnormal. So students will be influenced by mimetic mechanisms to the degree that role models and mentors and the diffusion of information support such stereotypes. However, it is the normative mechanisms that allow the maintenance of this phenomenon, even in the face of evidence that this may be unacceptable to other groups.

The inclusion of such stereotypes in the training materials and subsequent notions of physicians' work results from the ability, indeed the right, of this institution to have complete control over the knowledge base that physicians utilize to solve the medical problems that they deal with, both in the clinical setting and in terms of setting the research agenda. Fogarty (1992) has called this normative mechanism professional work and the data supports the notion that the ability of the institution to manipulate this body of knowledge has a great deal of impact on sex and age-based treatment differences. The treatment differences then might be thought of as professionally generated and maintained sexism and ageism as they relate to their exclusion from the body of knowledge and work that is seen to are important to the profession.

This research examined the bases for the existence of treatment differences based on patient age and sex and found that, while many physicians agreed that these differences do exist, few were anxious to determine their cause or origin. However, interview data has provided clues that can be combined with the small

amount of current literature in this area to propose some mechanisms by which these differences are generated and maintained, even in the face of overall increased utilization of drug therapies.

While there has been talk of medical school, and subsequent training, producing biased physicians due to teaching materials and textbooks which do not reflect the broader spectrum of patients which a physician will deal with, such a contention has not been found to be evident. This is not to say, however, that students are not exposed to, and do not integrate, certain stereotypes in their understanding of patients that do, in fact, influence their treatment patterns for specific sub-groups of patients. While no respondent directly referred to any age or sex bias that was learned during their training, there is evidence that suggests that such a bias does exist. Alexanderson's (1999) assessment of the medical literature suggested that the male is the norm, while the female is the exception. It might be assumed, although this remains untested, that a similar norm exists for elderly versus younger patients. Research around the contents of medical textbooks has found that generally, at all levels and for all ages, content is gender-biased (see for example Mendleshohn, Nieman, Isaacs et al, 1994; Zelek, Phillips and Lefebvre, 1997). Alexanderson (1999) goes on to suggest that there exists a strong gender bias with respect to not only the illustrations, but also the contents, and language of texts. "Male anatomy is often presented as the norm for "the" human, whereas the female counterpart, if referred to at all, is mentioned as an exception or as abnormal" (84). It would be

surprising indeed if repeated exposure to these types of biases in textbooks during the years of training that physicians endure did not influence their perceptions and beliefs regarding what is normal and what is the exception in the practice of medicine.

Phillips and Ferguson (1999) also found, in their assessment of students' attitudes towards women during medical school with a revised curriculum, that, while after 3 years of medical school students were somewhat less accepting of stereotypes according to gender (not significantly, however), there still existed a very strong conception that equated adults with men and women with not adult or other. This has the potential for the generation of a sex bias and "if a medical school reinforces social stereotypes, graduates may enter medical practice with fixed views that restrict communication, shape medical care and affect the health of women" (358). The existence of treatment differences would seem to confirm the reality of such a bias and the resultant impact on women's health and treatment outcomes. While some research suggests that revised curricula are having an impact on reducing stereotypes (Woodward, 1999), this research challenges the impact as immediate and widespread. If older physicians have an impact on the practice patterns of a wide variety of physicians in their region and/or specialty, mechanisms described in the subsequent section may well override the decreased tolerance of stereotyping exhibited by young and clinically inexperienced medical students.

The second mechanism that influences the treatment differences appears to be that of the professional attitudes and values, which are not influenced by the individual organizations that physicians are clearly independent from. These values are indeed influenced by the body of work discussed above, but are also transmitted by opinion leaders, mentors and role modeling, as well as social stereotypes regarding the status of physicians and their role in society and by the role that the literature plays as an accepted method of knowledge acquisition. The obvious example from the data is a relatively common refrain that elderly patients are often thought of as being frail, sick and not really benefiting from aggressive treatment. So it is normatively institutionalized to utilize patient age as a surrogate for health status. Even more ubiquitous, the data also suggest that physicians make estimates of the perceived cost/benefit of treating patients, and that elderly patients are seen to benefit less, mostly because physicians determine that they have less time to live. Thus the cost/benefit equation inevitably favours younger patients, while costly treatment may be withheld from more elderly patients as age becomes a measurement for number and quality of years left. As well, related to this cost/benefit measurement, physicians do not seem to place the same value on an elderly patient's life in terms of anticipated productivity and contribution to society. This clearly fails to favour the elderly patient when it comes to treatment decisions. Professional values and beliefs inform their practice patterns, which in turn result in age and sex-based practice pattern differences. In addition to this, the normative mechanism which excluded females and elderly from clinical trials

helps to minimize any performance inadequacies by allowing the professional to argue that his/her training does not allow them to extrapolate from the data, and this is completely justified by professional norms centred around how the literature should be interpreted.

As alluded to above, the exclusion of women, and the elderly, in clinical trials also has had a substantial effect on treatment patterns in AMI. Many sources recognize this exclusion, particularly in cardiology trials (see for example, Wiejer, 1999). Weijer (1999) suggests that women of reproductive age have wrongly been excluded from these trials "based on the reproductive role that women fulfil within the family." (34). This physiological difference, while real, can be considered "a complication only if male physiology is taken to be the norm." (34). As Weijer (1999) recognizes, this exclusion on the basis of sex is a form of domination. In terms of cardiology, it is much more typical to see women in their non-reproductive years accessing the health system for cardiac problems, yet women have been characterized on the basis of their reproductive role, regardless of the reality for the individual woman. Such exclusion, then, has greater implications for professional norms and beliefs than simply not being able to extrapolate the results from clinical trials to other groups of patients.

Less work has been done regarding the origin of patient age on patterns of practice and related outcomes. Certainly evidence exists that illustrates the existence of age-related treatment differences (see, for example, Lubben, Chi and Weiler, 1989; Ganz, 1992; Hamel, Teno, Goldman et al, 1999). Clearly the

exclusion of elderly patients and the illustrated beliefs around the value of elderly patients are at work and influence practice patterns and patient outcomes to a large extent in much the same manner that sex-related biases, exclusions from clinical trials and normative beliefs and values account for treatment differences based on sex.

The other normative issue that influences the maintenance of treatment differences is the institutionalized nature of performance standards and the physician coalition's apparent struggle to maintain the current standards. Since performance standards remain unrelated to the goodness of fit between current practices and 'optimal' practices, it is evident that the professional norms, which maintain treatment differences that result in suboptimal outcomes, will be enough, at the moment, to maintain the status quo. The same argument holds for stakeholders who might wish to change the system. Because the stakeholders also have an extremely difficult time monitoring performance due to the body of knowledge being relatively inaccessible, and current monitoring efforts that don't reflect practice pattern variation, attempts by other, less powerful stakeholders will have less influence, certainly on the institution of physicians, and likely on other stakeholders that also do not have access. As well, and as previously alluded to, institutional actors that attempt to bring inefficiencies to light are faced with a wall of normative beliefs and norms regarding the appropriateness of such behaviour. While respondents clearly measure prospective opinion leaders' worth based on normative values

regarding their work and practice, as well as publishing, another normative value prohibits them from publicly, in most cases, denouncing that individual. Similar to the code of silence regarding hiding or not publicizing the aberrant behaviour of institutional actors that has been recognized in sports teams, and in other professions, professional norms do not support this. So any anticipated deinstitutionalization due to the dissemination of the dissonant information of treatment differences will by thwarted by a variety of normative mechanisms, at least for a considerable time period. As Oliver (1992) explains, the dissemination of this type of information can cause a highly institutionalized practice to become deinstitutionalized, that is, cause the practice to change or evolve. However, the conditions that would allow this to occur do not appear to be in place in this instance. One might expect that the increasing focus on practice patterns and outcomes would be enough to cause practice patterns to be challenged, but what appears to be happening is the existence of normative and mimetic mechanisms that are extremely strong (or more highly institutionalized) and thus, are able to maintain current practice patterns, and practice pattern differences.

The final normative mechanism that has considerable influence on practice patterns, and particularly on the maintenance of practice patterns, is the structural conditions which afford an extensive and undisputed degree of autonomy to individual physicians as well as to the institution as a whole (Fogarty, 1992). Physicians are able to solely determine the definition of the

means and ends that will be encoded into their clinical regimes. If opinion leader consultation is seen as a fitting means to determine a treatment pattern, this is solely the decision of the physician and he/she is supported by the values and beliefs surrounding the importance of this autonomy within the institution. However, if the physician wishes to go it alone in the decision-making process, even with inadequate knowledge or impaired judgement, this is also an approved and normatively supported action.

In summary, the evidence supports the existence of all three types of isomorphic mechanisms. However, the strength of these mechanisms appears to vary and the evidence suggests that the proposition is upheld. Coercive mechanisms seem to present the lowest level of influence in generating and maintaining patterns of practice, although they do exist and this level of influence may change with attempted shifts of power between dominant coalitions. Mimetic mechanisms are greater in number and influence and include modeling, mentoring, opinion leaders, and diffusion. However, normative isomorphic mechanisms are greatest in number and in scope. Conceptions of professional work, self-image, attitudes, values and beliefs as well as structural conditions all heavily affect what practice patterns are generated and maintained.

The homogeneity and consistency of the data suggest that these coercive, mimetic and normative mechanisms are universal across the specialties and across geographical location. While individual physicians may have varying levels of understanding or insight into these processes, on average they

embrace the effectiveness of the normative mechanisms that are seen to be valued by the profession, such as the existence of a body of literature, the recognition of experts in the field, the notion that everybody practices the same, that CME is an effective way to interpret incorporate new knowledge form the body of literature, and that stereotypes regarding sex and age, while present, are not a tremendous problem that is defined by the profession.

The evidence presented in this research suggests that, much like Carpenter and Dirsmith's (1992) examination of statistical sampling in the audit process, practice patterns can be viewed employing institutional theory to illuminate the "socially constructed and influenced" aspect of such activity, rather than continuing on the assumption that such patterns are solely a technical phenomenon. This is not to say advances are not being made, however, the evidence presented suggests that mimetic and normative isomorphic mechanism present significant challenges for the future.

Implications

The findings from this research have several implications for both institutional theory and for the medical field. This research suggests that, indeed, the identification of isomorphic mechanisms is apt and enormously beneficial to increasing our understanding of professional behaviour in the institution of physicians. As Fitzgerald and Ferlie (1999) suggest, "in highly professionalised settings (such as medicine) knowledge shifts continue to be largely internally driven rather than externally imposed and so knowledge claims represent an

important component of professional dominance" (14). It is evident that levels of status and dominance, regarding both research and clinical practice, exist, largely along specialist and sub-specialist divisions, but not limited solely by such divisions. Normative mechanisms surrounding the institution's values and beliefs about status and knowledge influence greatly who is heard, what gets heard and how it gets heard. While many of the pieces of this puzzle are available in disparate literatures and theoretical bases, this research brings together these notions along with an understanding of how the institutional actors themselves regard the field.

As well, this research has extended the empirical and qualitative literature available within the institutional theory perspective, both in terms of incorporating all three isomorphic mechanisms put forth by DiMaggio and Powell, as well as increasing the institutional theory perspective in the field of health care. The findings suggest that isomorphic mechanisms have a vast potential to influence the behaviour of professionals, and this being so, an intimate understanding of each of the mechanisms can contribute to understanding and altering behaviour in an effective and efficient manner.

In the medical sphere, this research provides a much more complete description of how the institution of physicians operates and what influences the behaviour of physicians. Since much time, effort and resources are being invested in attempting to change physician behaviour, such investigative efforts are necessary to provide real and informed insights.

Limitations

This research is limited by several factors. First, it applies only to those physicians treating AMI's, although the interview data does cover practice patterns in a more general way, so the conclusions could possibly be extended. As well, it looks at practice patterns in an area in which there is a perception of a clear and indisputable body of evidence that defines clearly the appropriate management of the patient in question. This is not the case for much of the field of medicine, which makes identification of mechanisms perhaps more difficult and complex. Finally, while the large sample size of the questionnaire phase of the study likely makes the conclusions from the questionnaire generalizable to the broader population of physicians that treat AMI's, the relatively small sample of physicians included in the interview phase might give pause to individuals wishing to generalize the data, even to other physicians treating the same disease. However, the similarity of the results from the questionnaire data and the verbal protocol analysis, suggesting a truly representative sample, and should reduce anxiety surrounding this issue.

Future Research

This is not to suggest that further work is not warranted, indeed, called for. Institutional theory requires a much fuller and more specifically defined description of potential coercive, mimetic and normative isomorphic mechanisms in professional institutions. This definition would highlight, in particular, the complex nature of these mechanisms in professional setting, and would also

help to more fully distinguish the three types of isomorphic mechanisms. A more in-depth study in the same arena might allow a much deeper interpretation of the isomorphic mechanisms. In particular, two specific studies are envisioned. The first would focus on the role of the opinion leader and would be comprised of an in-depth study of a small sample of individuals. There are many important questions to be answered regarding this role. How are opinion leaders identified? Who is affected by perceived local opinion leaders? What is the sphere of geographical influence? What is the duration of the opinion leader influence? What is the role of the specialist, if not as an opinion leader?
Similar questions exist in terms of traditional recognized methods of learning. To what extent do physicians rely on each of the methods they believe adequately inform them? If effective, how long does the influence last? Should continuing medical education be focussed on specific groups to enable more effective and efficient dissemination?

The second study envisioned would look more closely at the 'medical literature'. This would consist of choosing two treatments either both that have been shown to be effective, or one that has been shown to be effective and the other shown to be ineffective or harmful. An analysis of the historical literature available may provide clues as to the nature of medical literature, who gets to hear what, why and how. As well, interviews with identified opinion leaders involved in the development of the use of the treatment in AMI, as well as other leaders in the

field, would provide a useful basis with which to further explore interactions of this nature.

More work is also needed in identifying the complex relational networks that emerge in the institution of physicians, and how these networks influence practice. Particularly the impact of the university sub-specialist and community-based specialist on the generation and dissemination of knowledge is of interest. This would help in identifying the true importance of these stakeholders in the process, in terms of their relative contributions and level of power in facilitating enduring changes in physician practice patterns.

Finally, the issue of institutional state and institutional process needs to have more light shed on it. As suggested in the previous chapter, the relative influences of the isomorphic mechanisms are unknown to any great degree. Tolbert and Zucker (1996) argue that the majority of the work focuses on institutionalization as a qualitative state, that is, either an organization, process or structure is institutionalized or it is not. Little attention has been paid to the elements that determine the variation in levels of institutionalization, assuming such levels exist. However, this research does imply that different mechanisms have different levels of institutionalization.

Tolbert and Zucker (1996) outline the processes of institutionalization: habitualization, objectification and sedimentation. Habitualization is the creation of a new arrangement in response to an identified organizational problem. This results in a structure or process that is in the pre-institutionalization phase.

Objectification has the solution being diffused to other organizations through some type of consensus of the organizational constituents. Finally, sedimentation is the continuity of the solution, particularly across generations of organizational actors.

This notion, combined with the mechanisms of isomorphism, as well as Oliver's (1992) contribution regarding the antecedents of deinstitutionalization, may come to be key considerations in the question at hand as it appears that there is, indeed, a non-trivial variation in the level of institutionalization in the prescribing patterns for AMI. That is, there may be interactions at work that have, heretofore, been seen as simple causal mechanisms. There may be multiple levels of institutionalized norms and behaviours involved in one process or behaviour. Tolbert and Zucker (1996) argue that these sequential processes of institutionalization suggest variability in levels of institutionalization, which then implies that some patterns of social behaviour are more subject to critical evaluation, change and eradication than others. That is, "such patterned behaviors can vary in terms of the degree to which they are deeply imbedded in a social system and thus vary in terms of their stability and their power to determine behavior" (181).

There is a question, then, regarding what, specifically, are the influences or mechanisms that have an impact on practice patterns, particularly in a setting where uncertainty may be defined as being relatively low and where a direct

intervention (perhaps which can be defined as a coercive mechanism) can change one aspect of a practice pattern while leaving another virtually untouched. It is here that the notions of processes of institutionalization are important to recognize as it seems obvious that the greater the degree of institutionalization, the more difficult to alter the practice pattern. Tolbert and Zucker (1996) discuss these processes in terms of habitualization, objectification and sedimentation.

Habitualization is the response to organizational problems and the structural arrangements that arise as a result of the solution to those problems. There are a number of characteristics that make the organizational change attainable. The activity associated with this change is likely an independent activity and the organizational actors that undertake the change share a common core of ideas and organizational knowledge. At this pre-institutionalization point, according to Tolbert and Zucker (1996), "there may be multiple adopters, but these are likely to be comparatively few, limited to a circumscribed set of similar, possibly interconnected organizations facing similar circumstances, and to vary considerably in terms of the form of implementation" (182).

Objectification follows habitualization and suggests that the change is diffused and moves toward a more enduring state. There exists a more widespread consensus that the change, as viewed by the constituents, is indeed a valuable one for the organization. Tolbert and Zucker (1996) identify two mechanisms by which such a consensus might occur. The first is the monitoring of the adoption

of the change by the organization. The greater the number of other organizations adopting the change, the greater the likelihood that the organization will view the change as a favourable one. Second, the change may be undertaken by a 'champion', "often in this case by a set of individuals with a material stake in the promotion of the structure" (183). In order for this group to be successful, they must first identify and define the initial problem as a generic one as well as assert that the identified solution to the problem can be justified on "empirical or logical grounds"(183). It can be argued that the original CQIN (Clinical quality Improvement Network) group accomplished both these elements. The physicians at the University of Alberta originally identified the sub-optimal utilization of treatment options and sought a solution through the use of feedback of practices and outcomes and the use of clinical guidelines. The problem was then identified to be generic in nature, that is, present in many organizations in the field. The intervention, or solution, was advanced by a small group of individuals and eventually adopted at organizations across the field. The solution was then justified through the collection of data that illustrated an increase in the use of efficacious drugs. However, this brought to the fore the existence of the treatment differences.

Finally, "full institutionalization involves sedimentation, a process that fundamentally rests on the historical continuity of structure, and especially on its survival across generations or organizational members" (Tolbert and Zucker, 1996: 184). As the authors indicate, it is likely that for sedimentation to occur

little resistance can take place by any individuals or groups that may oppose the change and its adoption. As well, there must be continued belief in, and promotion of, the change by the original supporters and those that have adopted the change and continue its support. To reverse the full institutionalization of an organizational feature, it is likely to require a major environmental shift or as Oliver (1992) suggests, deinstitutionalization may require that "dissonant information or unexpected, irrefutable events in the organization's environment often emerge to discredit or challenge the utility of the operating assumptions of organizations. Although these events and data may be idiosyncratic, non-repetitive and unpredictable, their consequences may be profound in terms of deinstitutionalizating existing beliefs and activities" (574). As has been evidenced, practice pattern variation, it is at this stage that it appears that the practice pattern treatment differences seem to emerge. The age and sex based differences in treatment patterns for AMI appear to have all the dimensions that would define this process in the full institutionalization stage, and while there does seem to be some information emerging to discredit or challenge the current practice pattern differences, the physicians do not appear to be embracing this information, which makes deinstitutionalization difficult, if not impossible. It appears that practice pattern differences in AMI are unlikely to be drastically altered or improved upon unless the coercive, mimetic and normative mechanisms acting upon the institution are recognized and dealt with in some manner.

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Appendix A: Questionnaire

Letters of Introduction

National Letter

CONTEMPORARY MANAGEMENT PATTERNS IN ACUTE MYOCARDIAL INFARCTION

Investigators:

Alberta
Koon K. Teo
Christopher R. Hinings
Wayne J. Tymchak
Laurel K. Taylor

British Columbia
Thomas Ashton

Nova Scotia
Jafna L. Cox

Ontario
C. David Naylor

Quebec
J.L. Guy Tremblay

June 6, 1997

Dear Colleagues:

Acute myocardial infarction (AMI) remains one of the major diseases in Ca and the impact of the disease outcome can have serious consequences perso and to society. The Clinical Quality Improvement Network (CQIN) investigat among many other investigators, have been addressing the issues of optimizing management of AMI and whether and how we physicians make use of abun data from clinical trials in the area of AMI in our practices. The C investigators now wish to conduct a survey (applied to the Medical Rese Council of Canada for funding) to study our attitudes and practice in management of AMI. We believe this is an important and worthwhile project would encourage your cooperation in completing the enclosed questionnaire.

Peter M. Olley, MD, FRCPC
President, Canadian Cardiovascular Society

Gerald W. Karr, MD, FRCPC
President, Canadian Society of Internal Medicine

Alberta

(Date)

Dear Colleague,

You are being requested to participate in a survey being conducted in partnership with the Clinical Quality Improvement Network (Edmonton, Alberta). The purpose of this survey is to determine contemporary Canadian practice patterns for the treatment of acute myocardial infarction. Enclosed you will find a short case study, followed by a questionnaire. ***If you have cared for a patient with myocardial infarction in the last year,*** please complete the questionnaire with as true a reflection of your usual practice as possible. The completed questionnaire should be returned in the self-addressed, stamped envelope.

If you have not cared for a patient with myocardial infarction in the last year, please check the box below and return the questionnaire in the self-addressed, stamped envelope. This will assist us in the analysis.

If you have any questions regarding the background, rationale or completion of the questionnaire, please contact the project office for assistance/advice at (403) 492-8525.

Your response confidentiality and your identity will be protected at all times, including in any publication of results. An identifier number is being used only to assist in identifying any potential response bias, as well as a mechanism to reduce the cost of mailing for reminders and additional questionnaires. Your individual response will **not** be matched at any time with your name.

Your consideration and cooperation are appreciated.

Sincerely,

Wayne J. Tymchak Laurel K. Taylor Koon K. Teo

❑	**I have not treated a patient with myocardial infarction in the last year. (We would appreciate if you would complete questions 12-22 of this questionnaire.)**

British Columbia

(Date)

Dear Colleague,

You are being requested to participate in a survey being conducted in partnership with the Clinical Quality Improvement Network (Edmonton, Alberta). The purpose of this survey is to determine contemporary Canadian practice patterns for the treatment of acute myocardial infarction. Enclosed you will find a short case study, followed by a questionnaire. ***If you have cared for a patient with myocardial infarction in the last year,*** please complete the questionnaire with as true a reflection of your usual practice as possible. The completed questionnaire should be returned in the self-addressed, stamped envelope.

If you have not cared for a patient with myocardial infarction in the last year, please check the box below and return the questionnaire in the self-addressed, stamped envelope. This will assist us in the analysis.

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Your consideration and cooperation are appreciated.

Sincerely,

Thomas Ashton, MD, FRCPC

G. B. Mancini, MD, FRCPC

❑	**I have not treated a patient with myocardial infarction in the last year. (We would appreciate if you would complete questions 12-22 of this questionnaire.)**

Nova Scotia
March 26, 1998

Dear Colleague,

You are being requested to participate in a survey being conducted in partnership with the Clinical Quality Improvement Network (Edmonton, Alberta). The purpose of this survey is to determine contemporary Canadian practice patterns for the treatment of acute myocardial infarction. Enclosed you will find a short case study, followed by a questionnaire. ***If you have cared for a patient with myocardial infarction in the last year***, please complete the questionnaire with as true a reflection of your usual practice as possible. The completed questionnaire should be returned in the self-addressed, stamped envelope.

If you have not cared for a patient with myocardial infarction in the last year, please check the box below and return the questionnaire in the self-addressed, stamped envelope. This will assist us in the analysis.

If you have any questions regarding the background, rationale or completion of the questionnaire, please contact the project office for assistance/advice at (403) 492-8525.

Your response confidentiality and your identity will be protected at all times, including in any publication of results. An identifier number is being used only to assist in identifying any potential response bias, as well as a mechanism to reduce the cost of mailing for reminders and additional questionnaires. Your individual response will **not** be matched at any time with your name.

Your consideration and cooperation are appreciated.

Sincerely,

Jafna L. Cox, BA, MD, FRCPC, FACC

David E. Johnstone, MD, FRCPC

❑ **I have not treated a patient with myocardial infarction in the last year. (We would appreciate if you would complete questions 12-22 of this questionnaire.)**

Ontario

(Date)

Dear Colleague,

You are being requested to participate in a survey being conducted in partnership with clinician-investigators across Canada and the Clinical Quality Improvement Network (Edmonton, Alberta). The purpose of this survey is to determine contemporary Canadian practice patterns for the treatment of acute myocardial infarction. Enclosed you will find a short case study, followed by a questionnaire. ***If you have cared for a patient with myocardial infarction in the last year,*** please complete the questionnaire with as true a reflection of your usual practice as possible. The completed questionnaire should be returned in the self-addressed, stamped envelope.

If you have not cared for a patient with myocardial infarction in the last year, please check the box below and return the questionnaire in the self-addressed, stamped envelope. This will assist us in the analysis.

If you have any questions regarding the background, rationale or completion of the questionnaire, please contact the project office for assistance/advice at (403) 492-8525.

Your response confidentiality and your identity will be protected at all times, including in any publication of results. An identifier number is being used only to assist in identifying any potential response bias, as well as a mechanism to reduce the cost of mailing for reminders and additional questionnaires. Your individual response will **not** be matched at any time with your name.

Your consideration and cooperation are appreciated.

Sincerely,

C. David Naylor, MD, D Phil, FRCPC

David Alter, MD, FRCPC

❑	**I have not treated a patient with myocardial infarction in the last year. (We would appreciate if you would complete questions 12-22 of this questionnaire.)**

Quebec

October __, 1997

Dear Colleague,

You are being requested to participate in a survey being conducted in partnership with the Clinical Quality Improvement Network (Edmonton, Alberta). The purpose of this survey is to determine contemporary Canadian practice patterns for the treatment of acute myocardial infarction. Enclosed you will find a short case study, followed by a questionnaire. ***If you have cared for a patient with myocardial infarction in the last year***, please complete the questionnaire with as true a reflection of your usual practice as possible. The completed questionnaire should be returned in the self-addressed, stamped envelope.

If you have not cared for a patient with myocardial infarction in the last year, please check the box below and return the questionnaire in the self-addressed, stamped envelope. This will assist us in the analysis.

If you have any questions regarding the background, rationale or completion of the questionnaire, please contact the project office for assistance/advice at (403) 492-8525.

Your response confidentiality and your identity will be protected at all times, including in any publication of results. An identifier number is being used only to assist in identifying any potential response bias, as well as a mechanism to reduce the cost of mailing for reminders and additional questionnaires. Your individual response will **not** be matched at any time with your name.

Your consideration and cooperation are appreciated.

Sincerely,

J.L. Guy Tremblay Laurel K. Taylor Koon K. Teo

❑	**I have not treated a patient with myocardial infarction in the last year. (We would appreciate if you would complete questions 12-22 of this questionnaire.)**

Questionnaire

CONTEMPORARY CANADIAN PATTERNS OF PRACTICE IN ACUTE MYOCARDIAL INFARCTION QUESTIONNAIRE
(Date)

The following is a case study of a patient presenting to hospital with prolonged chest pain. The details of the case provide the basis for patient management decisions. Please indicate in the space provided on the following pages how you, as the attending physician, would manage this patient in your care. Please be as accurate as possible in providing the reasoning for your management decisions.

CASE: Mr. John T.

Mr. T. was a 54 year old male who presented to the emergency department with a four hour history of central dull chest pain with some radiation into the back, neck and left arm. The pain began while the patient was resting after the evening meal and was not relieved by any change of position or by the intake of antacids.

Recently, in the last two weeks, there had been similar quality chest pain, but less severe, while doing light household duties. No medical attention was sought on these previous occasions as the pain disappeared rapidly with rest. Functional inquiry was negative but the patient had a past history of hypertension, type II diabetes mellitus and had been a smoker for the past 28 years. Current medications included thiazide diuretics, calcium channel blocker and insulin. There was no history of allergies, recent trauma or bleeding disorders.

When evaluated by the physician shortly after arrival in the emergency room, the patient still complained of considerable pain. He was diaphoretic and anxious, with a pulse of 105 beats/minute and a blood pressure of 165/90 mmHg; respiratory rate was 20/minute. The ECG monitor strips showed sinus rhythm with occasional isolated ventricular extrasystoles.

The jugular venous pulse waveform peak was at 2 cm above the sternal angle. Carotid waveform and volume were normal. Auscultation of the chest revealed basal end-inspiratory crepitations that disappeared with coughing. The apex beat location was normal. There was a fourth heart sound at the apex, with accentuated intensity on expiration.

The 12-lead ECG showed three mm of ST elevation in leads V1 to V4, compatible with acute anterior myocardial infarction. The chest X-ray showed mild hyper-inflation with no evidence of pulmonary vascular congestion. In the emergency room, initial CBC and creatinine values were all normal.

DIAGNOSIS

1. Please provide your diagnosis for the preceding case:

_____

_____

TREATMENT

Listed below are several treatment and drug therapies which could be used to treat the patient in the preceding case. Using the scales provided, please rate the likelihood that you would utilize each of the treatments or drug therapies indicated below.

Additionally, for each possible treatment or therapy, you will find several factors that may, or may not, have influenced your choice of treatment for the patient. Please rate how these factors affected your decision and likelihood rating.

2. **Overall likelihood of use of prophylactic *lidocaine***

Very Unlikely				Very Likely
❑	❑	❑	❑	❑

The following factors *influenced my decision*:

	Not at All		Somewhat		Substantially
Age of the patient	❑	❑	❑	❑	❑
Sex of the patient	❑	❑	❑	❑	❑
No previous myocardial infarction	❑	❑	❑	❑	❑
Previous smoker	❑	❑	❑	❑	❑
Diabetes	❑	❑	❑	❑	❑
Hypertension	❑	❑	❑	❑	❑
No other medical diseases	❑	❑	❑	❑	❑
Current literature	❑	❑	❑	❑	❑
Other (please specify)_____	❑	❑	❑	❑	❑
Other (please specify)_____	❑	❑	❑	❑	❑

3. **Overall likelihood of doing pre-discharge exercise stress test to help determine future risk**

Very Unlikely				Very Likely
❑	❑	❑	❑	❑

The following factors *influenced my decision*:

	Not at All				Substantially
Age of the patient	❑	❑	❑	❑	❑
Sex of the patient	❑	❑	❑	❑	❑
No previous myocardial infarction	❑	❑	❑	❑	❑
Previous smoker	❑	❑	❑	❑	❑
Diabetes	❑	❑	❑	❑	❑
Hypertension	❑	❑	❑	❑	❑
No other medical diseases	❑	❑	❑	❑	❑
Current literature	❑	❑	❑	❑	❑
Other (please specify)_____	❑	❑	❑	❑	❑
Other (please specify)_____	❑	❑	❑	❑	❑

4. **Overall likelihood of use of *beta-blocker*,** either IV or PO

Very Unlikely				Very Likely
❑	❑	❑	❑	❑

The following factors *influenced my decision*:

	Not at All				Somewhat Substantially
Age of the patient	❑	❑	❑	❑	❑
Sex of the patient	❑	❑	❑	❑	❑
No previous myocardial infarction	❑	❑	❑	❑	❑
Previous smoker	❑	❑	❑	❑	❑
Diabetes	❑	❑	❑	❑	❑
Hypertension	❑	❑	❑	❑	❑
No other medical diseases	❑	❑	❑	❑	❑
Current literature	❑	❑	❑	❑	❑
Other (please specify)_____	❑	❑	❑	❑	❑
Other (please specify)_____	❑	❑	❑	❑	❑

5. **Overall likelihood of *ambulatory ECG (Holter)* to help determine future risk**

Very Unlikely				Very Likely
❑	❑	❑	❑	❑

The following factors *influenced my decision:*

	Not at All		Somewhat		Substantially
Age of the patient	❑	❑	❑	❑	❑
Sex of the patient	❑	❑	❑	❑	❑
No previous myocardial infarction	❑	❑	❑	❑	❑
Previous smoker	❑	❑	❑	❑	❑
Diabetes	❑	❑	❑	❑	❑
Hypertension	❑	❑	❑	❑	❑
No other medical diseases	❑	❑	❑	❑	❑
Current literature	❑	❑	❑	❑	❑
Other (please specify)_____	❑	❑	❑	❑	❑
Other (please specify)_____	❑	❑	❑	❑	❑

6. **Overall likelihood of use of any *calcium channel blockers***

Very Unlikely				Very Likely
❑	❑	❑	❑	❑

The following factors *influenced my decision*:

	Not at All		Somewhat		Substantially
Age of the patient	❑	❑	❑	❑	❑
Sex of the patient	❑	❑	❑	❑	❑
No previous myocardial infarction	❑	❑	❑	❑	❑
Previous smoker	❑	❑	❑	❑	❑
Diabetes	❑	❑	❑	❑	❑
Hypertension	❑	❑	❑	❑	❑
No other medical diseases	❑	❑	❑	❑	❑
Current literature	❑	❑	❑	❑	❑
Other (please specify)_____	❑	❑	❑	❑	❑
Other (please specify)_____	❑	❑	❑	❑	❑

7. **Overall likelihood of *echocardiogram* or other measure of LV function**

Very Unlikely				Very Likely
❑	❑	❑	❑	❑

The following factors *influenced my decision:*

	Not at All		Somewhat		Substantially
Age of the patient	❑	❑	❑	❑	❑
Sex of the patient	❑	❑	❑	❑	❑
No previous myocardial infarction	❑	❑	❑	❑	❑
Previous smoker	❑	❑	❑	❑	❑
Diabetes	❑	❑	❑	❑	❑
Hypertension	❑	❑	❑	❑	❑
No other medical diseases	❑	❑	❑	❑	❑
Current literature	❑	❑	❑	❑	❑
Other (please specify)_____	❑	❑	❑	❑	❑
Other (please specify)_____	❑	❑	❑	❑	❑

8. **Overall likelihood of use of *aspirin***

Very Unlikely				Very Likely
❑	❑	❑	❑	❑

The following factors *influenced my decision*:

	Not at All				Somewhat Substantially
Age of the patient	❑	❑	❑	❑	❑
Sex of the patient	❑	❑	❑	❑	❑
No previous myocardial infarction	❑	❑	❑	❑	❑
Previous smoker	❑	❑	❑	❑	❑
Diabetes	❑	❑	❑	❑	❑
Hypertension	❑	❑	❑	❑	❑
No other medical diseases	❑	❑	❑	❑	❑
Current literature	❑	❑	❑	❑	❑
Other (please specify)_____	❑	❑	❑	❑	❑
Other (please specify)_____	❑	❑	❑	❑	❑

9. **Overall likelihood of *a serum lipid profile*, within 24 hours of admission**

Very Unlikely				Very Likely
❑	❑	❑	❑	❑

The following factors *influenced my decision*:

	Not at All				Substantially
Age of the patient	❑	❑	❑	❑	❑
Sex of the patient	❑	❑	❑	❑	❑
No previous myocardial infarction	❑	❑	❑	❑	❑
Previous smoker	❑	❑	❑	❑	❑
Diabetes	❑	❑	❑	❑	❑
Hypertension	❑	❑	❑	❑	❑
No other medical diseases	❑	❑	❑	❑	❑
Current literature	❑	❑	❑	❑	❑
Other (please specify)_____	❑	❑	❑	❑	❑
Other (please specify)_____	❑	❑	❑	❑	❑

10. **Overall likelihood of use of *thrombolytic therapy***

Very Unlikely				Very Likely
❑	❑	❑	❑	❑

The following factors *influenced my decision*:

	Not at All				Somewhat Substantially
Age of the patient	❑	❑	❑	❑	❑
Sex of the patient	❑	❑	❑	❑	❑
No previous myocardial infarction	❑	❑	❑	❑	❑
Previous smoker	❑	❑	❑	❑	❑
Diabetes	❑	❑	❑	❑	❑
Hypertension	❑	❑	❑	❑	❑
No other medical diseases	❑	❑	❑	❑	❑
Current literature	❑	❑	❑	❑	❑
Other (please specify)_____	❑	❑	❑	❑	❑
Other (please specify)_____	❑	❑	❑	❑	❑

11. **If a measurement of left ventricular ejection fraction was completed on the second hospital day and found to be 30 percent,**

I would:

Add another medication	___YES	___NO
Discontinue a medication	___YES	___NO

IF ADD A MEDICATION, what would you prescribe:

i)_____

ii)_____

iii)_____

IF DISCONTINUE A MEDICATION, which would you discontinue:

i)_____

ii)_____

iii)_____

The final set of questions is about you, your education and your practice. Most of the questions can be answered by circling the number next to the most appropriate answer. In a few cases you will be asked to write in an answer to the question.

12. What is your age? _____ years

13. Sex:
- Male ..... ❑
- Female ..... ❑

14. What is your current marital status?
- Single (never married) ..... ❑
- Married or living with partner ..... ❑
- Divorced ..... ❑
- Separated ..... ❑
- Widowed ..... ❑

15. Where did you complete the majority of your training for your speciality?
- Canada ..... ❑
- USA ..... ❑
- Outside North America ..... ❑

16. In which speciality do you practice?
- Cardiology ..... ❑
- General/Family Practice ..... ❑
- Internal Medicine ..... ❑
- Other_____ ❑ (please specify)

17. How many years in total have you practised? _____years

18. Which of the following categories describes the setting in which you currently treat acute myocardial infarction patients? (check as many as appropriate)

Solo Practice ..... ❑
Group Practice ..... ❑
Walk-in Clinic (Medicentre) ..... ❑
On Site Angiography ..... ❑
On Site Angioplasty ..... ❑
On Site Bypass ..... ❑
On Site Cardiology Trainees ..... ❑
On Site Internal Medicine Trainees... ❑
On Site Family Practice Trainees ..... ❑

19. Please indicate the number of years in which you have practised in your current work situation. _____years

20. Please indicate the category which describes how you spend most of your time at work.

Clinical/Patient Care ..... ❑
Research ..... ❑
Teaching ..... ❑
Administration ..... ❑

21. Please indicate the method by which you are reimbursed for your services.

Fee-for-Service ..... ❑
Practice Plan ..... ❑
Salary ..... ❑
Other ..... ❑

22. On average, how many patients with acute myocardial infarction do you treat per month?

I treat _____ acute myocardial patients per month.

♥ **Thank you very much for your responses** ♥

Please return the completed questionnaire before _____1997 in the self-addressed, stamped envelope provided or fax to: (403) 492-6059

If you have any questions, please contact the project office for assistance/advice at: (403) 492-8525

Appendix B

Interview Protocol

The purpose of this interview is for you to analyze and respond to a standard, hypothetical patient case, which I will give to you in a moment. What I am looking for is your usual practice pattern for this population of patients. That is, given the patient characteristics and situation, what treatment decisions would you make.

There are no right or wrong answers of course, I am simply attempting to define contemporary practice patterns for AMI patients and I hope to gain insights into the decision making processes of experts such as yourself, particularly subsequent to diagnosis.

What I would like you to do is to visualize your usual treatment setting and using the case, go through the questionnaire and respond to the questions. We will answer each question in order, and I ask that you provide the rationale for the decision that you are making. There is no need to justify your decision or remarks other than to elaborate as best you can on your reasoning throughout the case.

There is no need to write your answers on the questionnaire. We will be using it as a guide for our conversation. Also, you may or may not want to explicitly go through each of the factors influencing you decision for each question, but I would ask you to discuss each of those that did influence your decision to use or not use a specific treatment or test

I also want to reiterate that none of the information in these transcripts will ever be directly attributed to you.

Following the questionnaire I will be asking you some other more general and open-ended questions about practice patterns.

Do you have any questions before we begin?

(Turn on tape recorder now)

(Begin verbal protocol analysis of case. Physician should be directed to read the case out loud, interject whenever he/she feels like it or something comes to mind during the case scenario. Go through each question in order and stop at the end of question 11).

1. How do you think physician practice patterns are formed? That is, what types of activities influence your practice patterns?

2. There appears to be a fairly rigid process of professionalization that physicians undergo, as do lawyers, accountant, engineers, etc. What are the major factors in that process that contributed to or formed you practice patterns - from medical school, further training (residency, internship), professional medical associations, provincial medical association, Canadian medical association., continuing medical education, opinion leaders, other physicians within your department, practice, town, city.

3. Do you feel that there is any Quality of Life issues that have influenced your practice patterns in any way? Do patient desires or pressures influence your practice? To what extent? How about societal pressures, can you think of any such pressures that have influenced your practice patterns?

4. The genesis of this project is data that has been collected over the past several years that illustrates some treatment differences between men and women and older and younger patients, specifically for AMI, but it has shown up in the literature in many other disease states. What do you think about such data? What do you think influences these treatment differences? Why do they exist?

Appendix C

Tables

Table 6: Demographic Data for All Respondents That Do Not Treat AMI's, by Province

		AB	BC	NS	ON	QC	ALL
AGE (mean)		49	51	49	49	46	49
SEX	Male	69	70	56	62	56	62
	Female	31	30	44	38	44	38
MARITAL STATUS	Single	7	3	2	7	8	7
	Married	88	86	91	85	83	85
	Divorced	3	2	6	4	6	4
	Separated	1	2	1	2	2	2
	Widowed	2	2		2	2	2
SPECIALTY	Cardiology	2	2		1	2	1
	Internal Medicine	14	6	8	6	4	6
	General/Family Practitioner	50	60	68	77	75	71
	Other	35	33	24	15	20	21
PRACTICE EXP. (mean years)		20	21	21	20	19	20
MAJORITY OF TRAINING	Canada	74	75	79	84	92	84
	USA	6	1	2	3	3	3
	Outside North America	17	20	19	12	3	11
	Canada + USA	2	2		1	1	1
	Canada +Outside N.A.	1	1		1	1	1
	USA + Outside N.A.						
	Canada + USA + Outside N.A.		1				
MAJORITY OF WORK TIME	Clinical/Patient Care	79	79	90	86	88	85
	Research	11	6	5	6	5	6
	Teaching	5	4	5	4	8	5
	Administration	10	11	10	7	7	8
WORK SETTING	Solo Practice	22	20	26	29	21	25
	Group Practice	39	33	36	34	40	36
	Walk-in Clinic	5	8	6	5	18	9
	On-Site Angiography	2	1	3	2	3	2
	On-Site Angioplasty	2	1	2	2	3	2
	On-Site Bypass	2	1	2	2	2	2
	On-Site Cardiology Trainees	2	1	3	2	3	2
	On-Site Int. Medicine Trainees	3	2	5	3	4	3
	On-Site Family Practice Trainees	2	1	3	4	5	4
WORK SITUATION (mean years)		13	11	13	14	14	13
METHOD OF REIMBURSEMENT	Fee for Service (FFS)	70	61	64	72	56	66
	Practice Plan (PP)	8	3	8	4	2	4
	Salary	11	21	21	12	21	15
	Other	3	4	3	4	7	5
	FFS + Salary	4	5	3	4	10	6
	FFS + PP						

	AB	BC	NS	ON	QC	ALL
FFS + Other	1	2		1	3	1
PP + Salary	1			1		1
FFS + Salary + Other	3	6		1		2

Table 7: Demographic Data for All Respondents That Do Not Treat AMI's, by Specialty

		CARD	INTERN	GP'S	OTHER	ALL
AGE (mean)		59	55	47	50	49
SEX	Male	94	81	57	69	62
	Female	6	19	43	31	38
MARITAL STATUS	Single	3	9	7	7	7
	Married	81	79	86	84	85
	Divorced	6	5	4	6	4
	Separated	3	3	2	2	2
	Widowed	6	4	2	2	2
PROVINCE	Alberta	13	24	8	18	10
	BC	16	11	11	20	12
	Nova Scotia	0	5	4	4	4
	Ontario	38	44	50	33	49
	Quebec	34	17	28	25	25
PRACTICE EXP. (mean years)		28	24	19	20	20
MAJORITY OF TRAINING	Canada	56	79	87	79	84
	USA	22	11	1	5	3
	Outside North America	13	6	11	14	11
	Canada + USA	6	2	1	1	1
	Canada +Outside N.A.	3		1	0	1
	USA + Outside N.A.				0	0
	Canada + USA + Outside N.A.		1	0	0	0
MAJORITY OF WORK TIME	Clinical/Patient Care	69	72	93	72	85
	Research	13	12	1	17	6
	Teaching	13	11	3	7	5
	Administration	13	9	5	14	8
WORK SETTING	Solo Practice	38	23	30	13	25
	Group Practice	28	15	48	14	36
	Walk-in Clinic	6	1	12	2	9
	On-Site Angiography	22	7	1	4	2
	On-Site Angioplasty	19	6	1	3	2
	On-Site Bypass	13	6	1	4	2
	On-Site Cardiology Trainees	19	7	0	4	2
	On-Site Int. Medicine Trainees	9	15	1	6	3
	On-Site Family Practice Trainees	9	5	4	3	4
WORK SITUATION (mean years)		18	16	13	12	13
METHOD OF REIMBURSEMENT	Fee for Service (FFS)	66	60	76	43	66
	Practice Plan (PP)	7	12	1	10	4
	Salary	7	11	11	27	15
	Other	7	1	4	7	5
	FFS + Salary	14	7	5	7	6

	CARD	INTERN	GP'S	OTHER	ALL
FFS + PP			0	0	0
FFS + Other		1	2	2	1
PP + Salary		1	0	1	1
FFS + Salary + Other		7	1	3	2

Table 8: Demographic Data for All Respondents That Treat AMI's, by Province

		AB	BC	NS	ON	QC	ALL
AGE (mean)		43	42	43	43	41	42
SEX	Male	85	83	79	86	74	82
	Female	15	17	21	14	26	18
MARITAL STATUS	Single	10	10	8	8	10	9
	Married	87	86	90	89	84	87
	Divorced	2	3		2	4	2
	Separated	1	2	1	2	2	1
	Widowed	1					
SPECIALTY	Cardiology	10	9	24	18	18	15
	Internal Medicine	12	11	17	12	6	10
	General/Family Practitioner	63	67	54	63	69	64
	Other	15	14	6	7	8	11
PRACTICE EXP. (mean years)		15	14	14	15	13	14
MAJORITY OF TRAINING	Canada	74	80	91	88	95	86
	USA	4	1	1	2	2	2
	Outside North America	21	17	7	7	1	10
	Canada + USA	1	1	1	1	1	1
	Canada +Outside N.A.	1			1	1	1
	USA + Outside N.A.						
	Canada + USA + Outside N.A.						
MAJORITY OF WORK TIME	Clinical/Patient Care	97	97	97	97	97	97
	Research	3	3	1	4	4	3
	Teaching	3	2	4	3	6	4
	Administration	2	3	4	2	4	3
WORK SETTING	Solo Practice	20	30	34	44	24	33
	Group Practice	71	54	55	43	45	50
	Walk-in Clinic	3	6	9	8	35	13
	On-Site Angiography	12	12	19	12	15	13
	On-Site Angioplasty	12	10	18	10	14	11
	On-Site Bypass	10	10	19	9	12	11
	On-Site Cardiology Trainees	11	7	19	10	14	11
	On-Site Int. Medicine Trainees	15	11	24	15	18	15
	On-Site Family Practice Trainees	21	16	19	22	22	21
WORK SITUATION (mean years)		11	9	11	12	11	11
METHOD OF REIMBURSEMENT	Fee for Service (FFS)	92	86	67	83	77	83
	Practice Plan (PP)	3	2	14	5	3	4
	Salary	2	10	11	6	8	6
	Other	1	1	4	2	2	2
	FFS + Salary	1	2	2	3	6	3
	FFS + PP				1		

		AB	BC	NS	ON	QC	ALL
	FFS + Other			2	1	3	1
	PP + Salary						
	FFS + Salary + Other	1	1		1		1
AMI's/MONTH		3	3	3	3	10	5

Table 9: Demographic Data for All Respondents That Treat AMI's, by Specialty

		CARD	INTERN	GP'S	OTHER	ALL
AGE (mean)		45	45	42	40	42
SEX	Male	91	85	80	81	82
	Female	9	15	20	19	18
MARITAL STATUS	Single	4	12	9	14	9
	Married	93	83	87	81	87
	Divorced	1	3	2	5	2
	Separated	2	2	1	1	1
	Widowed					
PROVINCE	Alberta	10	18	15	24	
	BC	10	18	18	27	
	Nova Scotia	6	6	3	3	
	Ontario	47	45	39	28	
	Quebec	27	14	25	19	
PRACTICE EXP. (mean years)		14	15	15	12	14
MAJORITY OF TRAINING	Canada	87	82	86	94	86
	USA	5	7	1	1	2
	Outside North America	4	8	12	4	10
	Canada + USA	3	1	1	1	1
	Canada +Outside N.A.	1	1	1		1
	USA + Outside N.A.		1			
	Canada + USA + Outside N.A.		1			
MAJORITY OF WORK TIME	Clinical/Patient Care	95	93	98	94	97
	Research	11	5	1	6	3
	Teaching	10	3	2	7	4
	Administration	3	3	2	8	3
WORK SETTING	Solo Practice	38	48	32	20	33
	Group Practice	47	33	57	28	50
	Walk-in Clinic	4	2	18	5	13
	On-Site Angiography	48	11	3	26	13
	On-Site Angioplasty	42	10	3	23	11
	On-Site Bypass	39	10	2	21	11
	On-Site Cardiology Trainees	39	12	3	19	11
	On-Site Int. Medicine Trainees	45	29	4	28	15
	On-Site Family Practice Trainees	47	18	14	29	21
WORK SITUATION (mean years)		12	11	11	9	11
METHOD OF REIMBURSEMENT	Fee for Service (FFS)	74	80	87	75	83
	Practice Plan (PP)	13	7	1	6	4
	Salary	6	6	6	12	6
	Other	1	2	1	4	2
	FFS + Salary	4	1	4	2	3

		CARD	INTERN	GP'S	OTHER	ALL
	FFS + PP		1		1	
	FFS + Other		1	1	1	1
	PP + Salary					
	FFS + Salary + Other	1	1			1
AMI's/MONTH		3	5	3	4	5

Table 10: Mean Likelihood Scores for Use of Therapy and Risk Prediction for AMI

(1=Very Unlikely; 2=Unlikely; 4=Likely; 5= Very Likely)

	ALL
Aspirin	4.92 (98)
Thrombolytic Therapy	4.82 (96)
Beta Blocker	4.28 (82)
Calcium Blocker	2.21 (16)
Lidocaine	1.46 (10)
Lipid Profile	3.05 (47)
Exercise Stress Test	4.08 (76)
Echo	4.26 (81)
ECG Holter	1.94 (12)

NB: Numbers in parentheses illustrate the percentage of respondents indicating they are likely or very likely to utilize the associated therapy.

Table 11: Mean Likelihood Scored for Use of Therapy and Risk Prediction for AMI, by Province

	AB	BC	NS	ON	QC	ALL
Aspirin	4.92 (98)	4.92 (98)	4.93 (99)	4.9 (98)	4.96 (99)	4.92 (98)
Thrombolytic Therapy	4.84 (98)	4.86 (98)	4.85 (96)	4.82 (96)	4.78 (95)	4.82 (96)
Beta Blocker	4.27 (81)	4.24 (80)	4.62 (89)	4.32 (84)	4.2 (78)	4.28 (82)
Calcium Blocker	2.23 (16)	2.19 (13)	2.24 (17)	2.22 (16)	2.19 (19)	2.21 (16)
Lidocaine	1.38 (6)	1.42 (5)	1.24 (5)	1.54 (8)	1.47 (9)	1.46 (10)
Lipid Profile	3.08 (47)	2.77 (40)	3.2 (51)	3.14 (49)	3.06 (48)	3.05 (47)
Exercise Stress Test	3.98 (74)	3.87 (71)	4.36 (83)	3.91 (70)	4.56 (90)	4.08 (76)
Echo	3.73 (64)	3.88 (70)	4.01 (70)	4.45 (87)	4.56 (89)	4.26 (81)
ECG Holter	1.94 (12)	1.84 (8)	1.78 (12)	2.15 (17)	1.69 (8)	1.94 (12)

NB: Numbers in parentheses illustrate the percentage of respondents indicating they are likely or very likely to utilize the associated therapy.

Table 12: Treatment Comparisons for Therapies and Risk Prediction for AMI, by Province

(1=Very Unlikely; 2=Unlikely; 4=Likely; 5= Very Likely)

	AB (%)[a]	BC (%)	NS (%)	ON (%)	QC (%)	p-value (%)
Aspirin	98.7	98.4	98.8	98.2	99.4	0.51153
Thrombolytic Therapy	98.4	98.6	100.0	97.7	96.6	0.16206
Beta Blocker	90.6	89.0	96.2	90.6	86.9	0.07625*
Calcium Blocker	20.3	17.0	19.7	19.9	22.9	0.47108
Lidocaine	5.8	5.5	4.9	8.4	9.1	0.16087
Serum Lipid Profile	52.9	43.8	55.4	54.8	52.5	0.01963*
Exercise Stress Test	80.9	78.4	90.9	80.0	92.8	0.00000*
Echocardiogram	75.0	79.4	82.6	94.7	94.7	0.00000*
ECG Holter	14.2	9.4	13.5	19.8	8.8	0.00000*

[a] % refers to proportion of respondents choosing likely or very likely to utilize treatment or test

* significant difference in treatment patterns

Table 13: Mean Likelihood Scored for Use of Therapy and Risk Prediction for AMI, by Specialty

(1 = Very Unlikely; 2 = Unlikely; 4 = Likely; 5 = Very Likely)

	CARD	INTERN	GP'S	OTHER	ALL
Aspirin	4.95 (99)	4.92 (98)	4.92 (98)	4.94 (99)	4.92 (98)
Thrombolytic Therapy	4.91 (98)	4.91 (99)	4.78 (94)	4.87 (97)	4.82 (96)
Beta Blocker	4.74 (95)	4.61 (93)	4.09 (75)	4.38 (85)	4.28 (82)
Calcium Blocker	1.73 (5)	2.09 (8)	2.38 (21)	1.98 (12)	2.21 (16)
Lidocaine	1.14 (3)	1.17 (2)	1.63 (10)	1.24 (3)	1.46 (10)
Lipid Profile	3.76 (66)	3.31 (54)	2.85 (42)	2.93 (44)	3.05 (47)
Exercise Stress Test	4.49 (88)	4.42 (85)	3.98 (73)	3.73 (69)	4.08 (76)
Echo	4.66 (93)	4.26 (81)	4.19 (78)	4.03 (74)	4.26 (81)
ECG Holter	2.02 (14)	1.94 (11)	1.96 (13)	1.66 (8)	1.94 (12)

NB: Numbers in parentheses illustrate the percentage of respondents indicating they are likely or very likely to utilize the associated therapy.

Table 14: Treatment Comparisons for Therapy and Risk Prediction for AMI, by Specialty

(1 = Very Unlikely; 2 = Unlikely; 4 = Likely; 5 = Very Likely)

	CARD (%)[a]	INTERN (%)	GPS (%)	OTHER (%)	p-value (%)
Aspirin	98.7	98.6	98.6	98.7	0.99886
Thrombolytic Therapy	98.4	99.5	97.4	97.3	0.19876
Beta Blocker	97.4	98.5	85.2	94.1	0.00000*
Calcium Blocker	6.0	10.7	26.3	14.2	0.00000*
Lidocaine	2.5	1.9	10.6	2.8	0.00000*
Serum Lipid Profile	72.5	59.7	46.2	48.9	0.00000*
Exercise Stress Test	93.9	93.8	80.8	74.3	0.00000*
Echocardiogram	97.7	89.1	87.7	81.3	0.00000*
ECG Holter	16.2	13.1	14.7	8.7	0.12327

[a] % refers to proportion of respondents choosing likely or very likely to utilize treatment or test

* significant difference in treatment patterns

Table 15: Treatment Comparisons for Therapy and Risk Prediction for AMI, by Respondent Sex

	MALE (%)[a]	FEMALE (%)	p-value (%)
Aspirin	98.7	98.6	0.97277
Thrombolytic Therapy	97.6	98.6	0.25021
Beta Blocker	89.4	90.9	0.42237
Calcium Blocker	18.9	25.2	0.01681*
Lidocaine	8.0	5.1	0.05724*
Serum Lipid Profile	50.8	57.6	0.0254*
Exercise Stress Test	83.2	84.9	0.43387
Echocardiogram	88.4	90.9	0.20149
ECG Holter	14.7	11.5	0.12979

[a] % refers to proportion of respondents choosing likely or very likely to utilize treatment or test

* significant difference in treatment patterns

Table 16: Treatment Comparisons for Therapy and Risk Prediction for AMI, by Respondent Years of Practice

	<10 (%)[a]	10 - 25 (%)	>25 (%)	p-value
Aspirin	99.1	98.6	97.2	0.09854*
Thrombolytic Therapy	98.9	97.2	96.4	0.02031*
Beta Blocker	92.7	87.8	88.8	0.00617*
Calcium Blocker	16.4	21.2	25.3	0.01225*
Lidocaine	2.3	9.5	15.9	0.00000*
Serum Lipid Profile	57.1	49.5	49.5	0.00803*
Exercise Stress Test	84.4	83.2	80.5	0.39456
Echocardiogram	92.8	86.2	88.5	0.00017*
ECG Holter	8.9	15.5	24.2	0.00000*

[a] % refers to proportion of respondents choosing likely or very likely to utilize treatment or test

* significant difference in treatment patterns

Table 17: Treatment Comparisons for Therapy and Risk Prediction for AMI, by Respondent Age

	<30 (%)[a]	30 – 50 (%)	>50 (%)	p-value
Aspirin	98.3	98.9	97.9	0.26162
Thrombolytic Therapy	99.1	98.3	95.7	0.00453*
Beta Blocker	93.3	89.7	88.6	0.39586
Calcium Blocker	16.1	19.3	24.5	0.08046*
Lidocaine	0.0	6.3	15.2	0.00000*
Serum Lipid Profile	52.0	53.2	48.2	0.26654
Exercise Stress Test	89.1	83.6	81.9	0.22999
Echocardiogram	91.3	89.1	87.2	0.43095
ECG Holter	8.7	11.8	24.4	0.00000*

[a] % refers to proportion of respondents choosing likely or very likely to utilize treatment or test

* significant difference in treatment patterns

Table 18: Treatment Comparisons for Therapy and Risk Prediction for AMI, by Age and Sex of Patient

	54 Year Old (%)[a]	70 Year Old (%)	p-value	Female (%)	Male (%)	p-value
Aspirin	98.8	98.4	0.42360	98.7	98.5	0.79105
Thrombolytic Therapy	98.8	96.8	0.00234*	97.4	98.2	0.20277
Beta Blocker	91.4	88.2	0.02251*	89.4	90.1	0.63606
Calcium Blocker	20.0	20.2	0.93124	19.1	21.2	0.29243
Lidocaine	7.7	7.4	0.85006	7.6	7.5	0.90303
Serum Lipid Profile	54.4	49.9	0.05029*	52.8	51.4	0.53588
Exercise Stress Test	86.0	81.2	0.0047*	83.3	83.8	0.75720
Echocardiogram	89.6	88.2	0.32724	88.5	89.2	0.62726
ECG Holter	13.8	14.7	0.59186	13.5	15.1	0.31701

[a] % refers to proportion of respondents choosing likely or very likely to utilize treatment or test

* significant difference in treatment patterns

Table 19: Mean Level of Influence of Decision Factors to Utilize Therapy for AMI

(1 = not at all: 3 = somewhat; 5 = substantially)

	ASPIRIN	THROMBOLYTIC THERAPY	BETA BLOCKER	CALCIUM BLOCKER	LIDOCAINE
Age of patient	1.82 (16)	2.79 (35)	2.08 (17)	1.64 (8)	1.41 (6)
Sex of patient	1.7 (14)	1.81 (16)	1.64 (10)	1.38 (4)	1.23 (3)
No previous MI	1.54 (11)	2.36 (29)	1.84 (14)	1.58 (9)	1.36 (5)
Previous smoker	1.97 (21)	1.90 (18)	2.17 (20)	1.72 (11)	1.33 (5)
Diabetes	2.09 (23)	2.16 (23)	2.85 (33)	2.34 (24)	1.37 (6)
Hypertension	2.13 (24)	2.41 (25)	3.17 (48)	2.64 (32)	1.41 (6)
No other diseases	2.32 (27)	3.15 (49)	2.69 (35)	1.84 (13)	1.44 (7)
Current literature	4.54 (89)	4.61 (91)	4.37 (84)	3.89 (68)	4.13 (77)

Table 20: Mean Level of Influence of Decision Factors to Utilize Risk Prediction for AMI

(1 = not at all: 3 = somewhat; 5 = substantially)

	SERUM LIPID PROFILE	EXERCISE STRESS TEST	ECHO	ECG HOLTER
Age of patient	2.25 (24)	2.7 (32)	2.31 (25)	1.72 (11)
Sex of patient	1.81 (15)	1.94 (17)	1.62 (10)	1.44 (6)
No previous MI	1.67 (11)	2.16 (22)	2.13 (21)	1.6 (8)
Previous smoker	2.16 (24)	2.28 (14)	1.98 (17)	1.73 (13)
Diabetes	2.73 (40)	2.6 (19)	2.66 (35)	1.95 (18)
Hypertension	2.45 (32)	2.53 (32)	3.29 (52)	1.9 (17)
No other diseases	1.59 (9)	2.07 (18)	1.74 (10)	1.67 (11)
Current literature	3.86 (69)	3.88 (70)	3.7 (63)	3.2 (47)

Table 21: Mean Level of Influence of Decision Factors to Utilize Aspirin for AMI, by Province

(1 = not at all: 3 = somewhat; 5 = substantially)

	ASPIRIN				
	AB	**BC**	**NS**	**ON**	**QC**
Age of patient	1.91 (18)	1.95 (20)	1.51 (9)	1.79 (16)	1.75 (16)
Sex of patient	1.84 (17)	1.78 (15)	1.42 (8)	1.69 (13)	1.64 (13)
No previous MI	1.57 (11)	1.53 (11)	1.32 (5)	1.59 (12)	1.48 (9)
Previous smoker	2.01 (23)	2.04 (22)	1.51 (9)	1.96 (20)	1.97 (21)
Diabetes	2.14 (26)	2.22 (27)	1.64 (12)	2.06 (22)	2.09 (21)
Hypertension	2.22 (27)	2.25 (27)	1.79 (14)	2.1 (23)	2.11 (21)
No other diseases	2.4 (29)	2.49 (31)	2.05 (18)	2.26 (26)	2.31 (28)
Current literature	4.52 (88)	4.58 (89)	4.64 (92)	4.55 (89)	4.5 (88)

Table 22: Mean Level of Influence of Decision Factors to Utilize Thrombolytic Therapy for AMI, by Province

(1 = not at all: 3 = somewhat; 5 = substantially)

	THROMBOLYTIC THERAPY				
	AB	**BC**	**NS**	**ON**	**QC**
Age of patient	2.93 (36)	2.84 (35)	2.28 (23)	2.66 (32)	3 (41)
Sex of patient	1.95 (19)	1.88 (18)	1.54 (9)	1.72 (14)	1.85 (16)
No previous MI	2.47 (32)	2.51 (33)	2 (19)	2.3 (28)	2.34 (27)
Previous smoker	2.06 (23)	1.89 (17)	1.41 (5)	1.92 (19)	1.88 (16)
Diabetes	2.33 (29)	2.19 (23)	1.63 (10)	2.12 (23)	2.19 (22)
Hypertension	2.64 (31)	2.53 (28)	1.96 (12)	2.36 (25)	2.35 (23)
No other diseases	3.16 (48)	3.44 (57)	2.97 (46)	3.27 (44)	2.94 (54)
Current literature	4.59 (89)	4.65 (93)	4.69 (94)	4.61 (91)	4.58 (90)

Table 23: Mean Level of Influence of Decision Factors to Utilize Beta Blocker for AMI, by Province

(1 = not at all: 3 = somewhat; 5 = substantially)

	BETA BLOCKER				
	AB	BC	NS	ON	QC
Age of patient	2.2 (18)	2.11 (19)	1.54 (8)	2.05 (17)	2.14 (18)
Sex of patient	1.73 (12)	1.7 (12)	1.37 (6)	1.63 (10)	1.6 (9)
No previous MI	1.86 (16)	1.87 (14)	1.67 (10)	1.87 (15)	1.78 (13)
Previous smoker	2.06 (16)	2.17 (19)	1.71 (5)	2.22 (22)	2.26 (21)
Diabetes	2.98 (34)	2.93 (36)	2.46 (17)	2.81 (33)	2.87 (33)
Hypertension	3.26 (53)	3.3 (52)	3.06 (37)	3.25 (45)	2.9 (50)
No other diseases	2.7 (34)	2.88 (41)	2.56 (29)	2.6 (33)	2.75 (37)
Current literature	4.32 (81)	4.46 (87)	4.49 (90)	4.37 (84)	4.3 (83)

Table 24: Mean Level of Influence of Decision Factors to Utilize Calcium Channel Blocker for AMI, by Province

(1 = not at all: 3 = somewhat; 5 = substantially)

	CALCIUM CHANNEL BLOCKER				
	AB	**BC**	**NS**	**ON**	**QC**
Age of patient	1.65 (9)	1.59 (6)	1.42 (4)	1.69 (9)	1.6 (10)
Sex of patient	1.37 (4)	1.37 (4)	1.24 (1)	1.41 (5)	1.37 (5)
No previous MI	1.63 (9)	1.58 (7)	1.46 (4)	1.59 (7)	1.57 (8)
Previous smoker	1.77 (12)	1.63 (8)	1.84 (9)	1.70 (10)	1.77 (13)
Diabetes	2.44 (26)	2.4 (27)	2.04 (18)	2.27 (21)	2.42 (29)
Hypertension	2.7 (33)	2.75 (33)	2.33 (19)	2.62 (31)	2.6 (34)
No other diseases	1.91 (14)	1.91 (12)	1.62 (9)	1.78 (11)	1.9 (16)
Current literature	3.8 (64)	3.91 (68)	3.86 (73)	3.98 (66)	3.91 (72)

Table 25: Mean Level of Influence of Decision Factors to Utilize Lidocaine for AMI, by Province

(1 = not at all: 3 = somewhat; 5 = substantially)

	LIDOCAINE				
	AB	**BC**	**NS**	**ON**	**QC**
Age of patient	1.35 (6)	1.38 (5)	1.3 (4)	1.47 (5)	1.42 (7)
Sex of patient	1.19 (2)	1.25 (3)	1.17 (1)	1.27 (4)	1.2 (2)
No previous MI	1.36 (6)	1.35 (5)	1.23 (1)	1.38 (5)	1.33 (4)
Previous smoker	1.37 (7)	1.28 (4)	1.21 (3)	1.36 (6)	1.29 (4)
Diabetes	1.4 (8)	1.33 (5)	1.28 (4)	1.41 (6)	1.35 (4)
Hypertension	1.42 (8)	1.37 (6)	1.26 (4)	1.45 (7)	1.39 (5)
No other diseases	1.4 (7)	1.43 (8)	1.26 (4)	1.47 (7)	1.46 (9)
Current literature	4.27 (81)	4.15 (77)	4.24 (84)	4.07 (75)	4.12 (78)

Table 26: Mean Level of Influence of Decision Factors to Utilize Serum Lipid Profile for AMI, by Province

(1 = not at all: 3 = somewhat; 5 = substantially)

	SERUM LIPID PROFILE				
	AB	**BC**	**NS**	**ON**	**QC**
Age of patient	2.24 (23)	2.26 (26)	1.78 (14)	2.27 (24)	2.3 (26)
Sex of patient	1.97 (17)	1.81 (16)	1.33 (4)	1.8 (15)	1.8 (15)
No previous MI	1.73 (12)	1.73 (13)	1.51 (10)	1.67 (11)	1.6 (10)
Previous smoker	2.30 (27)	2.07 (21)	1.74 (16)	2.12 (23)	2.29 (26)
Diabetes	2.88 (44)	2.66 (40)	2.34 (29)	2.75 (40)	2.73 (39)
Hypertension	2.55 (33)	2.37 (31)	2.07 (25)	2.44 (31)	2.52 (32)
No other diseases	1.76 (11)	1.59 (10)	1.32 (6)	1.62 (11)	1.5 (7)
Current literature	3.78 (65)	3.92 (70)	4.1 (78)	3.8 (67)	3.92 (73)

Table 27: Mean Level of Influence of Decision Factors to Utilize Exercise Stress Test for AMI, by Province

(1 = not at all: 3 = somewhat; 5 = substantially)

	EXERCISE STRESS TEST				
	AB	**BC**	**NS**	**ON**	**QC**
Age of patient	2.58 (29)	2.73 (34)	2.33 (25)	2.64 (29)	2.92 (39)
Sex of patient	1.96 (17)	1.98 (18)	1.56 (10)	1.92 (16)	1.99 (20)
No previous MI	2.31 (30)	2.39 (27)	1.96 (17)	2.18 (21)	1.93 (17)
Previous smoker	2.30 (27)	2.33 (26)	1.86 (15)	2.21 (23)	2.41 (31)
Diabetes	2.56 (35)	2.63 (35)	2.2 (23)	2.53 (30)	2.77 (40)
Hypertension	2.54 (36)	2.61 (33)	2.35 (26)	2.41 (28)	2.71 (37)
No other diseases	2.06 (18)	2.09 (16)	1.71 (12)	2.05 (17)	2.15 (22)
Current literature	3.76 (67)	3.76 (66)	4.01 (78)	3.76 (65)	4.21 (82)

Table 28: Mean Level of Influence of Decision Factors to Utilize Echocardiogram for AMI, by Province

(1 = not at all: 3 = somewhat; 5 = substantially)

	ECHO				
	AB	**BC**	**NS**	**ON**	**QC**
Age of patient	2.33 (23)	2.42 (27)	2 (20)	2.25 (23)	2.38 (27)
Sex of patient	1.66 (11)	1.68 (12)	1.29 (3)	1.62 (10)	1.6 (11)
No previous MI	2.32 (22)	2.31 (24)	1.95 (19)	2.18 (21)	1.95 (17)
Previous smoker	2.07 (19)	2.02 (17)	1.59 (11)	2.00 (18)	1.92 (16)
Diabetes	2.61 (30)	2.63 (34)	2.23 (21)	2.64 (35)	2.8 (39)
Hypertension	3.14 (45)	3.21 (52)	2.88 (33)	3.23 (51)	3.59 (63)
No other diseases	1.98 (13)	1.73 (9)	1.46 (4)	1.73 (9)	1.68 (10)
Current literature	3.3 (48)	3.55 (58)	3.66 (63)	3.68 (53)	4.03 (74)

Table 29: Mean Level of Influence of Decision Factors to Utilize ECG Holter Monitor for AMI, by Province

(1 = not at all: 3 = somewhat; 5 = substantially)

	ECG HOLTER				
	AB	**BC**	**NS**	**ON**	**QC**
Age of patient	1.78 (12)	1.66 (9)	1.42 (7)	1.8 (12)	1.62 (10)
Sex of patient	1.51 (7)	1.4 (5)	1.25 (3)	1.51 (8)	1.36 (4)
No previous MI	1.7 (9)	1.51 (4)	1.36 (4)	1.68 (10)	1.51 (7)
Previous smoker	1.90 (17)	1.64 (10)	1.61 (12)	1.82 (15)	1.57 (9)
Diabetes	2.05 (20)	1.86 (16)	1.81 (18)	2.07 (21)	1.75 (14)
Hypertension	2.09 (22)	1.81 (14)	1.69 (15)	2.01 (19)	1.69 (12)
No other diseases	1.67 (12)	1.59 (10)	1.44 (7)	1.66 (9)	1.77 (14)
Current literature	2.75 (31)	3.04 (41)	2.94 (42)	3.21 (47)	3.6 (62)

Table 30: Mean Level of Influence of Decision Factors to Utilize Aspirin for AMI, by Specialty

(1 = not at all: 3 = somewhat; 5 = substantially)

	ASPIRIN			
	Cardiologists	**Internists**	**GP's**	**Other**
Age of patient	1.28 (5)	1.48 (9)	2.04 (21)	1.56 (10)
Sex of patient	1.19 (3)	1.45 (9)	1.91 (18)	1.44 (6)
No previous MI	1.17 (4)	1.42 (9)	1.68 (13)	1.35 (6)
Previous smoker	1.31 (7)	1.67 (13)	2.21 (26)	1.69 (15)
Diabetes	1.36 (7)	1.86 (18)	2.35 (29)	1.8 (16)
Hypertension	1.4 (7)	1.88 (17)	2.4 (30)	1.81 (16)
No other diseases	1.84 (15)	2.11 (21)	2.5 (32)	2.18 (22)
Current literature	4.64 (91)	4.71 (93)	4.47 (87)	4.63 (91)

Table 31: Mean Level of Influence of Decision Factors to Utilize Thrombolytic Therapy for AMI, by Specialty

(1 = not at all: 3 = somewhat; 5 = substantially)

	THROMBOLYTIC THERAPY			
	Cardiologists	Internists	GP's	Other
Age of patient	2.36 (26)	2.5 (28)	2.98 (39)	2.54 (29)
Sex of patient	1.34 (7)	1.58 (12)	2.12 (19)	1.75 (13)
No previous MI	1.45 (7)	1.76 (15)	2.72 (38)	2.09 (21)
Previous smoker	1.34 (5)	1.58 (13)	2.12 (22)	1.75 (16)
Diabetes	1.57 (8)	1.81 (17)	2.41 (29)	1.91 (19)
Hypertension	2.04 (15)	2.2 (19)	2.55 (29)	2.34 (23)
No other diseases	2.5 (30)	2.8 (40)	3.39 (56)	3.06 (46)
Current literature	4.74 (94)	4.83 (97)	4.53 (89)	4.69 (93)

Table 32: Mean Level of Influence of Decision Factors to Utilize Beta Blocker for AMI, by Specialty

(1 = not at all: 3 = somewhat; 5 = substantially)

	BETA BLOCKER			
	Cardiologists	Internists	GP's	Other
Age of patient	1.79 (10)	1.76 (11)	2.23 (21)	1.93 (11)
Sex of patient	1.29 (4)	1.35 (6)	1.79 (13)	1.51 (7)
No previous MI	1.55 (6)	1.57 (8)	1.96 (17)	1.8 (13)
Previous smoker	1.79 (9)	2.02 (14)	2.33 (24)	1.94 (14)
Diabetes	2.02 (11)	2.54 (20)	3.12 (41)	2.74 (28)
Hypertension	2.81 (39)	2.83 (36)	3.31 (52)	3.18 (49)
No other diseases	2.25 (23)	2.51 (31)	2.82 (38)	2.75 (38)
Current literature	4.58 (90)	4.69 (93)	4.23 (81)	4.5 (87)

Table 33: Mean Level of Influence of Decision Factors to Utilize Calcium Channel Blocker for AMI, by Specialty

(1 = not at all: 3 = somewhat; 5 = substantially)

	CALCIUM CHANNEL BLOCKER			
	Cardiologists	Internists	GP's	Other
Age of patient	1.22 (2)	1.3 (3)	1.8 (11)	1.58 (6)
Sex of patient	1.09 (.4)	1.2 (2)	1.48 (6)	1.37 (4)
No previous MI	1.37 (4)	1.39 (5)	1.67 (9)	1.55 (7)
Previous smoker	1.47 (5)	1.61 (9)	1.83 (13)	1.52 (8)
Diabetes	1.71 (8)	2.05 (17)	2.6 (31)	2.01 (16)
Hypertension	1.99 (13)	2.38 (23)	2.88 (39)	2.39 (23)
No other diseases	1.49 (5)	1.61 (10)	1.98 (15)	1.78 (10)
Current literature	4.16 (77)	4.13 (75)	3.76 (63)	3.93 (69)

Table 34: Mean Level of Influence of Decision Factors to Utilize Lidocaine for AMI, by Specialty

(1 = not at all: 3 = somewhat; 5 = substantially)

	LIDOCAINE			
	Cardiologists	Internists	GP's	Other
Age of patient	1.22 (3)	1.12 (2)	1.55 (8)	1.18 (1)
Sex of patient	1.1 (2)	1.06 (.5)	1.32 (4)	1.1 (.5)
No previous MI	1.14 (2)	1.09 (1)	1.47 (6)	1.29 (4)
Previous smoker	1.11 (3)	1.09 (2)	1.43 (7)	1.22 (4)
Diabetes	1.13 (3)	1.13 (2)	1.49 (7)	1.23 (4)
Hypertension	1.14 (3)	1.17 (3)	1.54 (9)	1.26 (4)
No other diseases	1.13 (2)	1.18 (3)	1.58 (10)	1.31 (5)
Current literature	4.4 (85)	4.48 (88)	3.98 (73)	4.3 (82)

Table 35: Mean Level of Influence of Decision Factors to Utilize Serum Lipid Profile for AMI, by Specialty

(1 = not at all: 3 = somewhat; 5 = substantially)

	SERUM LIPID PROFILE			
	Cardiologists	Internists	GP's	Other
Age of patient	2 (14)	2.04 (18)	2.37 (28)	2.14 (22)
Sex of patient	1.36 (5)	1.55 (10)	1.97 (19)	1.71 (10)
No previous MI	1.24 (3)	1.51 (9)	1.82 (14)	1.59 (8)
Previous smoker	1.66 (10)	1.92 (18)	2.34 (29)	2.05 (21)
Diabetes	2.37 (27)	2.87 (36)	2.63 (44)	2.58 (38)
Hypertension	2 (18)	2.24 (26)	2.62 (37)	2.28 (28)
No other diseases	1.37 (4)	1.45 (6)	1.69 (10)	1.52 (6)
Current literature	4.2 (78)	4.27 (78)	3.75 (66)	3.6 (61)

Table 36: Mean Level of Influence of Decision Factors to Utilize Exercise Stress Test for AMI, by Specialty

(1 = not at all: 3 = somewhat; 5 = substantially)

	EXERCISE STRESS TEST			
	Cardiologists	Internists	GP's	Other
Age of patient	2.57 (24)	2.58 (30)	2.78 (35)	2.55 (28)
Sex of patient	1.6 (10)	1.75 (14)	2.07 (21)	1.8 (12)
No previous MI	1.67 (9)	1.84 (15)	2.35 (27)	2.15 (20)
Previous smoker	1.65 (11)	2.02 (22)	2.50 (30)	2.11 (19)
Diabetes	1.92 (17)	2.34 (28)	2.84 (40)	2.38 (26)
Hypertension	1.92 (16)	2.29 (26)	2.75 (38)	2.29 (24)
No other diseases	2.01 (14)	1.82 (11)	2.15 (21)	1.93 (12)
Current literature	4.21 (79)	4.23 (80)	3.74 (67)	3.83 (65)

Table 37: Mean Level of Influence of Decision Factors to Utilize Echocardiogram for AMI, by Specialty

(1 = not at all: 3 = somewhat; 5 = substantially)

	ECHO			
	Cardiologists	**Internists**	**GP's**	**Other**
Age of patient	1.62 (8)	1.88 (17)	2.54 (30)	2.38 (27)
Sex of patient	1.14 (2)	1.4 (7)	1.77 (13)	1.6 (9)
No previous MI	1.7 (11)	1.9 (16)	2.3 (24)	2.24 (24)
Previous smoker	1.24 (3)	1.61 (9)	2.21 (22)	2.01 (17)
Diabetes	1.93 (15)	2.43 (28)	2.87 (41)	2.65 (31)
Hypertension	2.53 (27)	3 (42)	3.54 (61)	3.1 (45)
No other diseases	1.34 (3)	1.41 (3)	1.89 (12)	1.84 (12)
Current literature	4.08 (75)	3.86 (69)	3.57 (59)	3.61 (59)