What Can Physicians Tell Us About Managed Care Tools?

A DISSERTATION
SUBMITTED TO THE FACULTY OF THE GRADUATE SCHOOL
OF THE UNIVERSITY OF MINNESOTA
BY

Margaret King Davis

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF
DOCTOR OF PHILOSOPHY

Kathleen T. Call, Ph.D., Advisor
Todd H. Rockwood, Ph.D., Co-Advisor

December 2010

Acknowledgements

I’d like to thank Chris for making this all possible, Connie, Susan and Laura for helping me get time to work, Jill, Charles & Shannon for convincing me that this monumental task is worthwhile and something I was capable of completing and my advisors and family for being so supportive. Owen, Tyler, Clara and Audrey – you are my sunshine.

Abstract

Over the past three decades, physician-directed managed care tools have been used extensively by health plans to influence physician practice and control health care costs. The success of these tools varies widely as do the specifics of how they are implemented. Organizations involved in implementation of managed care tools are evolving, as are the tools themselves. Gaining insight into physicians' views on how managed care tools impact quality of care could help in the development of more effective tools.

The purpose of this thesis is to address two questions regarding physicians' attitudes towards managed care tools: Do physicians practicing in the same clinics have similar views of managed care tools? Do physicians' views of managed care tools differ across practice settings and organizational structures (e.g., types of clinics and health plans)? Using the literature on physician job attitudes and sociological and economic theory to guide the investigation, these questions are addressed by looking at the effects of physician, clinic and health plan characteristics on physicians' attitudes toward managed care tools.

Data for this study come from the PEHP survey of physicians in 15 health plans and 5 major cities nationwide with supplementary health plan information from Interstudy (1997). The data was collected in 1998-99. The initial sample of 4,800 physicians was stratified to be half generalists and half specialists. The overall response rate was 68% and N = 3,459.

The first part of the analysis consists of structural equation modeling (SEM) to test the new typology of managed care tools. The scales developed in the first part are then used as dependent variables in a hierarchical linear modeling (HLM) analysis to explore the role of physicians' work setting and health plan affiliation on attitudes toward managed care tools.

Results of the SEM indicate that managed care tools can be described and classified in terms of the types of control they exert on physicians. Results of the HLM analysis suggest that physicians practicing in the same clinic and health plans share some similar attitudes toward managed care tools, but the majority of differences are still at the physician level. Physician characteristics included in this study do not explain these differences, leaving open the question of whether the majority of variation is due to real differences in how individual physicians experience managed care tools, or due to measurement error. Future analysis could clarify this issue if clinic associations can be identified more accurately and/or better physician level predictors are developed.

Table of Contents

List of Tables

List of Figures

Chapter 1. Introduction

Over the past three decades, physician-directed managed care tools have been used extensively by health plans to influence physician practice and control health care costs. The success of these tools varies widely as do the specifics of how they are implemented. Organizations involved in implementation of managed care tools are evolving, as are the tools themselves. Gaining insight into physicians' views on how managed care tools impact quality of care could help in the development of more effective tools. Current literature on the relationship between physicians and managed care tends to focus on physicians' general evaluations of managed care and how it impacts health care, without regard to the mechanisms through which these effects occur (Christianson, Warrick, et al. 2005).

Physician-directed managed care tools can be organized into three types based on mechanisms of organizational control: financial incentives (i.e., capitation, risk sharing, bonuses and withholds), rules and regulations (i.e., prior authorizations, utilization review, disease management and formularies) or education and selection (provider profiling, clinical guidelines, continuing medical education and network restrictions) (Ouchi 1980; Snell and Youndt 1995). Evidence on effectiveness of these tools is conflicting. A tool that proves successful in one study is often found ineffective in another (Flynn, Smith, Davis 2002). Interpretation of this literature is complicated by at least three factors. First, multiple managed care tools are often simultaneously

implemented to increase the overall effectiveness of the intervention. For example, Davis et al. (1995) found that studies using three or more educational strategies in combination had more positive results than studies using fewer strategies. While these findings show that using multiple strategies can be fruitful, it is difficult to separate the effect of individual tools. Second, success of the intervention may be influenced by structure of the organization in which they are implemented. For example, Schectman, Kanwal, et al. (1995) found that an education and feedback intervention for changing physician prescribing behavior was more successful with physicians in a staff model health maintenance organization (HMO) than in a network-model HMO. Third, physicians and their patients still make the final decisions on care. For managed care tools to be effective in changing physicians' practice decisions, physicians need to cooperate with the tool. Several researchers have shown that physicians' negative attitudes toward clinical guidelines are a significant barrier to their use (Woolf, 1993; Hargraves, Palmer et al. 1996; Cabana, Rand, et al., 1999; Elovainio, Makela, et al., 2000). Difficulties involved in interpreting the literature on managed care tool effectiveness show that additional research is needed to better understand how to improve these interventions.

Building on the physician attitudes literature, this study attempts to focus on attitudes about the impact of managed care tools on quality of patient care. The reason for this focus is that it may increase the probability that physician attitudes toward managed care

tools are predictive of physician adherence. A study of clinical guidelines found that physicians' belief that a guideline recommendation will not lead to an improved outcome is an important predictor of physician adherence (Cabana, Rand, et al. 1999). Extending this conclusion to other types of managed care tools, if physicians think a tool is pushing them to act in a way that compromises quality of patient care they are likely to attempt to thwart the effects and/or use of that tool. There is evidence in the literature that some physicians attempt to thwart managed care tools or "game the system" (Gravelle, Sutton, et al. 2010). This study found that clinic characteristics were associated with exception and prevalence reporting in the UK after implementation of a new pay-for-performance scheme for general practitioners in 2004/5. If physicians were not gaming, exception and prevalence rates would have been entirely explained by patient characteristics. Physician gaming may lead to unintended consequences of managed care tools, such as increased costs and lower quality of care. An example of physician gaming in the US health care system is "upcoding" in the case of diagnosis-related groups (DRGs)[1]. A better understanding of physician attitudes toward managed care tools may also help lower the chances that a newly implemented tool will lead to negative unintended consequences.

[1] Fraudulent practice in which services are billed for higher CPT codes than were actually

Specific Aims

The purpose of this thesis is to address two questions regarding physicians' attitudes towards managed care tools:

- Do physicians practicing in the same clinics have similar views of managed care tools?
- Do physicians' views of managed care tools differ across practice settings and organizational structures (e.g., types of clinics and health plans)?

Using the literature on physician job attitudes and sociological and economic theory to guide the investigation, these questions are addressed by testing components of a theoretical framework for managed care tools and looking at predictors of physicians' attitudes toward managed care tools at three organizational levels: physicians, clinics and health plans. The specific aims of this thesis reflect the two questions stated above:

1) To examine physician, clinic and health plan characteristics that lead to more positive and negative attitudes about managed care tools.
2) To evaluate the relative importance of different layers of MCO's organizational structure (e.g., physicians, clinics and health plans) in explaining physicians' attitudes toward managed care tools.

---

performed; results in a higher payment by Medicare or 3rd-party payers. (Segen, J. C. 2002)

The first specific aim addresses the role of physician, clinic and health plan characteristics in shaping physicians' attitudes about managed care tools. Physician-level variables in this study include age, gender, specialty and practice type. Clinics and health plans represent two layers in the organizational structure between physicians and managed care organizations (MCOs) that may influence physician attitudes toward managed care tools. Larger clinics may implement their own set of tools while buffering physicians from the health plan's efforts to control physician practice. Clinics also provide the social context in which physicians interact with managed care tools. Social information processing theory (Salancik and Pfeffer 1978) suggests that we can learn the most about behavior of workers by studying the informational and social environment in which that behavior occurs. Clinics are one of the environments in which physicians interact with managed care tools. In addition to size of clinics, other characteristics of interest include percent of physicians in the group who are generalists, practice type, average time with the plan, and average number of denials in the past six months. Health plans are generally viewed as the primary initiator of managed care tools and, therefore, exert significant influence over their implementation (Landon, Wilson, et al., 1998). Physicians in staff model HMOs may be more accepting of managed care tools than physicians in network/mixed and IPA model health plans due to the differences in their physician-health plan relationships. Health plan characteristics investigated in this study include health plan model type, market area, average number of denials in the past six months, and size of physician panel.

The second specific aim focuses on the nesting of physicians within clinics and health plans. Multiple studies have shown that clinic and health plan variables have been predictive of physician attitudes, but none have described the relative importance of each level of the organizational structure within MCOs. The analysis will estimate what proportion of the variation in attitudes is at the physician, clinic and health plan levels.

In summary, physicians' attitudes toward managed care tools are not well understood. Since use of these tools is ongoing and evolving, investigation of the ways in which physician characteristics, clinics and health plans influence physician attitudes could be useful for improving the implementation of physician-directed managed care tools.

Chapter 2. Background & Significance

The focus of this study is physician attitudes about managed care tools. The large quantity of literature available for framing this study requires that it be organized into three sections: the source (physician), the context (managed care organizations), and the subject (managed care tools) of these attitudes. Included in this third section is a description of a new typology of managed care tools based on mechanisms of control. Other typologies of managed care tools found in the literature are described and compared to the new typology. An overview of relevant information found in the physician job attitudes literature is followed by an examination of a subset of key articles in this area focusing on physician attitudes about how managed care tools affect quality of care. Finally, the significance of the study is examined with respect to the link between attitudes and behavior and the evolution of managed care tools and MCOs since the data for this study were collected.

2.1 Source of Attitudes: Physicians

Physicians have long been viewed as the prototype of a professional in the sociology literature (Hafferty 2006). But as the practice of medicine has moved from solo to group practice and physicians engage in new financial relationships with managed care organizations, physicians have taken on two additional roles: suppliers and workers. Understanding the three different physician roles helps define variables of interest and hypotheses for this study.

Professionals are an exclusive occupational group whose work is based in abstract bodies of knowledge (Abbott 1988). In the process of education and training, professionals are socialized into their role as autonomous actors and experts over a specific domain. Much of the socialization of physicians occurs during medical school and training. During this process physicians internalize the norms of their profession, such as altruism (patient interest above physician self interest), accountability, excellence, duty, service, honor, integrity, and respect for others (ABIM 1995). As a result of physicians' professional role, they tend to value learning from others within the profession and autonomy in their worklife (Hafferty 2006). Literature on the relationship between physicians and managed care organizations focuses much attention on the inherent conflict between physician autonomy and management by organizations and people outside the profession (Sharma 1997). Managed care organizations have attempted to get around this conflict by developing strategies that take advantage of physicians' professional values to influence medical practice. These tools include clinical practice guidelines, continuing medical education, and provider profiling (Landon, Wilson, et al. 1998). (See section 2.3.3 for further description of education/selection tools.)

In contrast to the professional perspective, the physician as supplier perspective emphasizes the profit-maximization goal of physicians in the process of providing patient care (Sharma 1997). The supplier perspective is primarily found in the economics

literature and is concerned with defining contractual problems associated with conflicting interests between physicians and third-party payers (McGuire 2000). The goal of contracts between managed care organizations and physicians is to bring the physicians' goals into alignment with organizational goals (Sharma 1997). The physician's primary self-interest is assumed to be profit maximization, but this can be tempered by professional factors, such as autonomy and altruism. Therefore, the supplier perspective is not necessarily a competing paradigm but a co-existing perspective that broadens our understanding of the incentives involved in physician reimbursement (Sharma 1997). Managed care organizations have developed an array of financial incentive strategies to influence medical practice. These strategies include capitation, risk sharing, withholds, bonuses and pay-for-performance (Flynn, Smith, et al. 2002; Christianson, Knutson, et al. 2006). (See section 2.3.1 for further description of financial incentives.)

The perspective of physician as worker is newer and is the consequence of physicians entering into new employment relationships with insurers and hospitals. The norm of autonomy described in the professional model is in conflict with the worker role. Evolution of physicians' employment relationships has been described as deprofessionalization or de-skilling of the medical profession (Hoff 2001). It is likely that physicians have agreed to take on this new role for at least two reasons. First, it may be seen as an inevitable transition resulting from market forces. The other possible

reason is that physicians receive benefits in exchange for taking on the worker role, such as flexible work hours and a more predictable work schedule (Robinson 1999).

The worker perspective portrays physicians as "active agents" negotiating the terms of their work life in different ways across a variety of work settings. Like the supplier view, the worker perspective provides another way of looking at physicians that builds on the other two perspectives (Williams 2001). Managed care organizations have developed strategies for managing physician practice that are typical of those used in employment relationships with non-physicians. These strategies include prior authorizations, restrictive formularies and utilization review (Flynn, Smith, et al. 2002). (See section 2.3.2 for further description of rules/regulations).

Hoff (2001) provides a thorough examination of how the three perspectives view physician attitudes and behavior (Table 2-1. Comparing Three Ways of Viewing Physician Attitudes and Behavior). This table was adapted from the original by selecting six criteria most relevant to this study. These criteria include 'Chief driver of physician action', 'Surrounding context', 'Dominant theoretical lens', 'Management-physician interaction', 'Physician identity', and 'Management/research view of physicians'. In the worker view, meaning derived from work is the primary motivator, or 'chief driver of physician action'. For the professional view, the primary motivator is pursuit of professional ideals (e.g., providing the best possible care to patients, protecting

Table 2-1. Comparing Three Ways of Viewing Physician Attitudes and Behavior (adapted from Hoff 2001)

Criterion	Worker View	Professional View	Supplier/Agent View
1) Chief driver of physician action	Meaning of work	Professionalism	Instrumentality
2) Surrounding context	Defined through a variety of situational variables (i.e., personal, social, economic, professional)	Narrowly defined in terms of "pro" or "anti" professionalism	Narrowly defined in terms of economic incentives
3) Dominant theoretical lens	Sociology (of work)	Sociology (of professions)	Economics (principal-agent theory)
4) Management–physician interaction	Ranges from cooperative to combative	Inherently distrustful and combative	Purely instrumental and calculative
5) Physician identity	Heterogeneous; socially constructed, subjective	Homogeneous; collectively determined by professional ideal	Homogeneous; economic man or woman
6) Management/research view of physicians	Multiple identities and images—diversity and differentiation	Single stereotype—homogeneity	Single stereotype—homogeneity

autonomy, etc.) and for the supplier/agent view the primary motivator is instrumentality. Instrumentality means that physicians are motivated by the only "measureable" outcome of work (i.e., compensation). Surrounding context is defined broadly in the worker view and includes variables defined by the situation. In contrast, the professional and supplier/agent views define the surrounding context in narrow terms. The professional view defines surrounding context in terms of things that support or impede physician practice and the supplier/agent view is restricted to the economic incentives involved in patient care. The dominant theoretical lenses are different across the three physician views, therefore, they rarely overlap within studies. Management-physician interaction, physician identity and management/research view of physicians are all broadly defined in the worker view, but narrowly defined in the professional and supplier/agent views. In the following chapter, all three physician views in Hoff's framework will be applied to social information processing theory (Salancik and Pfeffer 1978) to define variables of interest and frame the concept of physician needs described by the conceptual model.

2.2 Context of Attitudes: Managed care organizations

Managed care organizations (MCOs) are diverse entities that can be made up of multiple layers of organization between health plan and physicians (Landon, Wilson, et al. 1998; Brach, Sanches, et al. 2000). Some physicians contract directly with the health plan, while some join clinic groups that hold the health plan contract. Or the clinic is part of a larger entity, known as a medical group, which holds the contract. All of these

arrangements can exist within a single MCO. The following discussion addresses the importance of the layers of organization within MCOs in the implementation of managed care tools.

Clinics play an important role in the implementation of managed care tools for two reasons. First, contractual relationships between health plans and clinics have become more common (Landon, Wilson, et al. 1998). The fact that clinics act as a layer of organization between the physician and health plan means that they may act as a buffer in the physician-MCO relationship (Thompson 1967). Second, larger clinics have started initiating their own managed care tools (Wholey, Christianson, et al. 2003a; Christianson, Warrick et al. 2005; Kerr, Mittman, et al. 1996). When this occurs, clinics can influence physician attitudes toward managed care tools in much the same way as health plans do.

In addition to the clinic's role in implementation of managed care tools, the clinic setting represents the work group in which physicians interact with colleagues (Landon, Wilson, 1998). Physicians who socialize and work together on a regular basis are likely to have similar experiences with managed care tools and share opinions about those experiences with each other.

Health plans often determine the quantity and variety of managed care tools employed by the organization, as well as the means by which these tools are implemented.

Organizational characteristics of the health plan (e.g., market area norms, health plan model type, and health plan size) are likely to influence physician attitudes about managed care tools.

2.3 Object of Attitudes: Managed care tools

Managed care tools are mechanisms by which organizations, such as health plans, medical groups and clinics, attempt to control the delivery of services. Whether the goal of the tool is to control costs and/or improve quality of care, the means by which managed care tools accomplish these goals is by influencing the care process in some way.

Based on Snell and Youndt's (1995) typology of organizational control (see Table 2-2. Types of Human Resource Management Control Systems), managed care tools can be classified into three categories: (1) financial incentives (output control), (2) rules/regulations (behavior control) and (3) education/selection (input control). (The operationalization of are discussed in the Methods section.) This framework represents the perspectives of physicians as professionals, suppliers and workers because each of these perspectives corresponds to a type of control.

- Financial incentives represent control mechanisms from the supplier perspective.
- Rules/regulations represent control mechanisms from the worker perspective.

- Education/selection represents control mechanisms from the professional perspective.

Table 2-2. Types of Human Resource Management Control Systems*

	HRM Practices	Assumptions
Output control (Financial incentives)	Mutually set performance targets (e.g., goals, objectives). Subordinate performance appraisals are based on the results they achieve, and monetary rewards are closely linked to performance outcomes.	Performance requires flexible pursuit of opportunities that arise unexpectedly. Orientation toward goal accomplishment as a means for achieving effectiveness. Most appropriate in an open system where performance standards are crystallized.
Behavior control (Rules/ regulations)	Responsibilities are standardized and imposed top-down with an overriding concern for procedures and methods. Employees are accountable for their actions, regardless of results. Appraisals are based on supervisor observation of behavior. Feedback is used as a remedial tool.	Performance is enhanced when idiosyncratic action is constrained. Reliable role behavior leads to efficiency that facilitates operations. Most appropriate in those circumstances that characterize a closed system: the task environment is stable, and knowledge of cause-effect relationships are complete.
Input control (Education/ selection)	Rigorous selection and training help to socialize employees to ensure they have requisite abilities as well as understand and internalize the values and goals of the organization. In this way they are likely to act in the interest of the firm on their own.	Loyalty and commitment eliminate divergent interests and create an environment of cooperation. Most viable when performance standards are ambiguous and knowledge of cause-effect relationships are incomplete.

*Adapted from Snell and Youndt (1995)

The organizational control framework described by Snell and Youndt (1995) also provides insights into possible relationships between physician attitudes and managed care tools. The three types of managed care tools are described below.

2.3.1 Financial Incentives

Output control can be described as financial incentives with respect to physician management. Financial incentives represent control mechanisms of the supplier perspective. Financial incentives have low costs of implementation because they are self-enforcing reward structures, but require easily observable outcomes and standards. In health care, outcomes and standards are often not readily available so managers have to devise ways of observing outcomes and establishing standards of performance. Tying financial incentives to provider profiling is one way of establishing these standards.

Snell and Youndt (1995) define output control (i.e., financial incentives) as a way of linking personal interests with organizational goals. This approach to management gives individuals discretion over the processes they use while providing incentives for outcomes that benefit the firm (Kerr 1985). Financial incentives are most common in situations where outcomes and standards are easily observed. This type of control is preferred in situations where high costs are associated with monitoring and averting counterproductive performance.

2.3.2 Rules/Regulations

Snell and Youndt (1995) define behavioral control as a way of routinizing the transformation process. Management practices of this type include standard operating procedures, behavioral performance appraisal and close supervision. Behavioral control is efficient at managing routine tasks, but slow to accommodate change due to uncertainty (Cheng and McKinley 1983).

Behavioral control can also be described as rules and regulations with respect to physician management. Rules and regulations represent the control mechanisms of the worker model. Studies of this type of managed care tool focus on the barriers to efficient production and better outcomes. Professionals in this process are just members of the whole team involved in producing the "product" of healthcare. This type of control emphasizes the need to create a supportive organizational culture to view performance and motivate workers to do their best.

2.3.3 Education and Selection

Snell and Youndt (1995) define input control as selecting and training individuals so they become intrinsically dedicated to the firm. Socialization is often used in this process to produce high commitment in employees as a result of internalized values. It is preferable to other forms of control when knowledge is incomplete and standards of desirability are ambiguous (Ouchi 1977).

Input control can also be described as education and selection with respect to physician management. The professional view of physicians helps broaden Snell and Youndt's (1995) definition of input control because they don't discuss the close relationship between input control and the socially accepted control practices within the professions. Physicians are socialized in medical school to accept physician oversight and expert opinion as mechanisms for controlling their behavior. Peer comparisons rely on the provider's concerns about reputation and desire to conform to profession-wide standards (Flynn, Smith, et al. 2002).

This framework for understanding physician-directed managed care tools is helpful in understanding the value system involved in the formation of physician attitudes. For example, Chehab, Panicker, et al. (2001) found that physicians practicing in a staff/group model HMO were more positive about guidelines (education/selection) and formularies (rules/regulations) than physicians in office-based independent practice. Since financial incentives were not included in this analysis, interpretation of the findings is limited to two of the three types of managed care tools. However, these findings suggest that physicians working in independent practice value autonomy more than physicians practicing in staff/group model HMOs.

2.3.4 Other Typologies of Managed Care Tools

Schulz and Schulz (1988); Hillman (1991); Landon, Wilson et al. (1998); Gleid (1999); Grembowski, Diehr et al. (2000) all confirm the classification of managed care tools described above, with some minor contradictions. None of these classifications are based on a theoretical framework. Without an understanding of the underlying control mechanisms, it is difficult to evaluate hybrid managed care tools, (e.g. pay-for-performance) and make predictions about how they will be viewed by physicians.

Borowsky, Goertz, et al. (1995) and Smith, Bindman, et al. (2001) use a classic professional model of managed care tools to predict differences in physician attitudes across health plans. Their model categorizes managed care tools into facilitators and barriers to providing high quality care to patients. While this describes some aspects of managed care tools, this model doesn't reflect the growing importance of physicians working in groups (worker perspective) and the financial incentives involved in shaping physician attitudes (supplier perspective).

2.4 Physician Attitudes About How Managed Care Tools Influence Quality of Care

Most of the studies conducted on physician job attitudes are based on the professional perspective because they are conducted by and for physicians as a way of expressing their overall dissatisfaction with managed care. The professional perspective is

characterized by a general focus on aspects of managed care that impact physician autonomy. However, components of supplier and worker perspectives can be identified. Financial incentives (supplier perspective) are usually distinguished by fee-for-service vs. capitation. This distinction was more useful in the early years of managed care when it was getting established in the healthcare marketplace. The distinction between fee-for-service and capitation is becoming less useful as complexity of contracts increase and more physicians experience a mix of financial arrangements. Group practice and health plan type variables (both could be described as part of a worker perspective) also tend to lack specificity. Often the only practice or health plan information reported is a variable for staff model HMO vs. non-staff HMO. For staff model physicians their group practice and health plan are the same. But for non-staff physicians these variables should be identified separately. This study builds on the physician job attitudes literature by improving on the specificity of both practice type and health plan type variables in the analyses. Instead of including financial incentives as independent variables, physician attitudes toward financial incentives are evaluated as one of three dependent variables in this study.

The following is an examination of a critical set of articles, which specifically address physician attitudes about how managed care tools influence quality of care. The findings are separated into categories of variables in this study: independent variables (physician, clinic and health plan levels) and dependent variables (managed care tools). A detailed

description of these articles can be found in Appendix A: Key Literature on Physician Attitudes Toward Managed Care Tools.

2.4.1 Physician-level Variables

Findings were mixed with regard to gender, specialty and years in clinical practice. Three studies found no significant differences between male/female physicians in physician attitudes about how managed care tools influence quality of care (Borowsky, Davis, et al. 1997; Chehab, Panicker, et al. 2001; Reschovsky, Reed, et al. 2001). One study found a small but significant difference between men and women: men rated managed care tools more positively than women (Feldman, Novak, et al. 1998). While specialists were excluded from several studies, four included specialists in the analysis. Only one study found no differences between generalists and specialists (Halm, Causino, et al. 1997). The other three studies found that specialists tend to view managed care tools more negatively than generalists (Borowsky, Davis, et al. 1997; Chehab, Panicker, et al. 2001; Reschovsky, Reed, et al. 2001). There was also disagreement between studies for years in clinical practice (or physician age). Some studies found no significant differences between younger and older physicians (Borowsky, Davis, et al. 1997; Chehab, Panicker, et al. 2001; Reschovsky, Reed, et al. 2001). Another study found that older physicians tend to view managed care tools more negatively than younger physicians (Halm, Causino, et al. 1997).

The literature suggests that physician-level variables are only marginally useful in explaining physician attitudes. These variables are included in the study because they are the only physician-level variables described in the literature and the novel use of multilevel analysis in this study may yield different results.

2.4.2 Clinic-level Variables

Multiple indicators of practice setting characteristics were found to be important in explaining physician attitudes (Chehab, Panicker, et al. 2001; Reschovsky, Reed, et al. 2001; Williams, Zaslavsky, et al. 1999). Physicians in group settings are less likely to express concerns about managed care tools than those in solo and two-physician practices. Higher number of managed care contracts (but not percent of practice revenue from managed care) was associated with more negative evaluations of managed care tools. This suggests that it is not the amount of managed care in a physician's practice that leads to more negative attitudes but the number of different organizations attempting to implement the managed care tools. At the time that data for this study were collected (1998-99), the national average for number of managed care contracts was 10.9 for generalists and 13.7 for specialists (Stoddard, Reschovsky, et al. 2001). This study includes practice setting as an independent variable along with clinic size, specialty, and a measure of "managedness" within the clinic (for further descriptions see section 4.4.2).

2.4.3 Health Plan-level Variables

Staff and Group Model HMO physicians tend to rate all types of managed care tools more positively than physicians working in other health plan arrangements (Borowsky, Davis, et al. 1997; Chehab, Panicker, et al. 2001). Other than this distinction between staff/group model physicians and all other types of physicians, no other health plan level variables were described in the analyses. This study includes health plan model, size, market area and a measure of "managedness" within the health plan (for further descriptions see section 4.4.2).

2.4.4 Managed Care Tools

Clinical guidelines and educational strategies tend to be rated higher than financial incentives, formularies and other rules and regulations (Chehab, Panicker, et al. 2001; Williams, Zaslavsky, et al. 1999). This finding indicates that physicians prefer the mechanisms of control found in the professional perspective (i.e. education/selection) over financial incentives and rules/regulations. The present study attempts to further explain these differences in how physicians view the three types of managed care tools.

This review indicates that there are several gaps in the literature. As with the general physician attitudes literature, none of the studies include variables representing all three of the physician perspectives (i.e., professional, supplier and worker) described previously. In addition, health plan and clinic characteristics are present in some of the

studies but they often lack specificity. For example, several studies use the distinction between staff/group model practices and all other types of practices to capture variability associated with practice setting (Chehab, Panicker, et al. 2001; Cykert, Hansen, et al. 1997; Reschovsky, Reed, et al. 2001). And finally, none of the articles present a theoretical justification for grouping managed care tools in a meaningful way.

This study proposes to address these three gaps in the literature by (1) creating a typology of managed care tools, (2) developing a theory of physicians' attitudes about how managed care tools influence quality of care that integrates the roles of physicians as professionals, suppliers and workers, and (3) including clinic and MCOs characteristics in the analysis, as well as modeling the nested structure of physicians within clinics and clinics within health plans.

2.5 Attitudes-Behavior Link

As stated in the introduction, one of the justifications for measuring physician attitudes toward managed care tools is because these attitudes are assumed to be predictive of physician behavior. However, there is some disagreement in the literature about the link between attitudes and behavior (Schuman 1995). Attitudes toward an object are not always good predictors of behavior toward that object. For example, a physician's opinion that a health plan's formulary does not contain an adequate range of medications

does not necessarily predict whether the physician will prescribe a non-formulary medication with an individual patient.

Research has shown that several factors contribute to the predictive value of attitudes. In their review of the literature, Fazio and Olson (2003) found that the predictive power of attitudes is enhanced when specificity of the attitude and behavior match (Ajzen and Fishbein 1977; Davidson and Jaccard 1979; Kraus 1995). Another component of the link between attitudes and behavior is aggregating over time (Fishbein and Ajzen 1974; Weigel and Newman 1976). Therefore, attitudes are more likely to predict behavior over months and years than in a single snapshot of time. Two other important predictors of the attitude-behavior relationship are opportunity to engage in the behavior and social norms (Ajzen and Madden 1986; Kelly and Breinlinger 1995). In Fishbein and Ajzen's (1975) 'theory of reasoned action' these predictors are called perceived behavioral control and perceived social norms.

Information about behavior of the physicians in this study is not available so the predictive value of the measured attitudes cannot be tested. However, several characteristics of the survey items and behaviors of interest contribute to the hypothesis of a strong relationship between measured attitudes and physician compliance with managed care tools. First, the survey items refer to specific managed care tools implemented by individual health plans. Therefore, the attitudes are measured at the

same level as the behavior of interest. For example, in the following item: "The health plan's efforts to implement clinical guidelines have helped my patients to get better care" the measured attitude is likely to predict a physician's general cooperation with those policies, but not necessarily a physician's decision to follow guidelines with an individual patient. Second, managed care tools tend to be directed at the most routine aspects of care. Thus, opportunity for physicians to comply (or not comply) with managed care tools is high, particularly for generalists. Third, items are worded to direct attention toward the impact of the individual managed care tools on the quality of patient care. Social norms among physician peers are likely to be more accepting of non-compliance with managed care tools if that behavior is justified by doing the best thing for the patient.

2.6 Evolution of MCOs and Managed Care Tools

Since the data in this thesis were collected in 1998-99 a few important trends regarding managed care organizations and physician-directed managed care tools should be considered. First, the managed care marketplace has changed considerably since the data were collected. The distinctions between health plan model types (IPA, network/mixed and staff HMO) have become less clear (Ginsburg 2005). This makes predictions regarding physician attitudes about managed care tools within these different organizational types more difficult. Second, managed care penetration has increased (Ginsburg 2005). This development may contribute to making the results of this analysis

more generalizable than when the data were originally collected because managed care tools are more widespread. Third, the organizations involved in implementation of managed care tools have diversified (Christianson, Warrick, et al. 2005). For example, managed care tools may originate from multiple layers of the organization including medical groups and clinics within a single MCO. Fourth, hybrid managed care tools have been developed. For example, purchasers of care in some market areas have started using pay-for-performance initiatives to encourage improvements in quality of care (Christianson, Knutson, et al. 2006). This new managed care tool incorporates aspects of financial incentives and education/selection (feedback on performance). Some have expressed concern about the unintended consequences of pay-for-performance contracts associated with physicians trying to "work around" the requirements of these contracts (Gravelle, Sutton, et al. 2010; SGIM 2009). Measuring physician attitudes about this hybrid managed care tool may be useful in monitoring their unintended consequences. Lastly, it is likely that more hybrid tools will be developed in the future. This development may be accelerated by the managed care competition encouraged by the recent passing of the 2010 health care reform bill. The managed care tool typology and conceptual model of physician attitudes and behavior toward managed care tools developed in this study could contribute to the evaluation and monitoring of evolving tools.

Overall, managed care has grown in importance since the data for this study were collected. The typology of managed care tools and results of analysis provided in this thesis may help make predictions about how physicians will respond to changes in current managed care tools, help monitor the development of hybrid tools and tools that have yet to be created.

Chapter 3. Theory

The literature on physician job attitudes focuses primarily on job satisfaction (Borowsky, Davis, et al. 1997; Linzer, Konrad, et al. 2000; Williams and Skinner 2003) and is largely absent of theory. The theoretical model for this thesis combines two theories to provide new insights into our understanding of physician attitudes about managed care tools: social information processing (SIP) perspective and agency theory. The SIP model of job attitudes (Salancik and Pfeffer 1978), which builds on need-satisfaction models, provides an understanding of the social context surrounding implementation of managed care tools. Agency theory (Eisenhardt 1989; Wright, Mukherji, et al. 2001) provides a better understanding of the relationship between physicians and MCOs. The following sections describe need-satisfaction models, SIP and agency theories and discuss how each are useful in the study of physicians working in MCOs.

3.1 Need-satisfaction Models

Need-satisfaction models provide a framework for understanding how the intersection between job characteristics and worker expectations lead to job behaviors. These models include two general features. First, job characteristics provide a stimulus for the formation of job attitudes. Second, needs are the filter through which workers react to their job. Need-satisfaction models assume that workers have a set of needs that are either fulfilled or frustrated by their current work situation. A "need" is broadly defined as something that is necessary for organisms to live a healthy life. "Needs" can be

objective and physical, such as food, or they can be subjective and psychological, such as the need for self-esteem. A worker's attitudes toward his/her job are believed to be the result of objective determinations of how well the characteristics of the job (i.e., task) match their needs. (Salancik and Pfeffer; 1977) Need-satisfaction models are used to predict attitudes and behavior on the basis of personal characteristics (Kanungo and Wright 1983; Laitinen 1992).

Need-satisfaction models are important for two reasons. First, they are the foundation on which the social information processing perspective is based. Second, they justify the use of predictors found in the physician job satisfaction literature (Linzer, Konrad, et al. 2000; Williams and Skinner 2003). The limited range of physician characteristics appearing in the literature suggests a narrow interpretation of 'physician needs' limited to the physician as professional perspective (Hoff 2001). To illustrate this point, a hypothesis arising from the professional perspective is that an 'older, male, specialist' in a staff-model HMO is likely to have the same needs as an 'older, male, specialist' working in private practice. This assumption is consistent with the professional perspective because it assumes relative homogeneity among physicians, but contradicts the worker and supplier/agent perspectives (see Table 2-1. Comparing Three Ways of Viewing Physician Attitudes and Behavior). With the addition of the worker and supplier/agent perspectives, physician needs can be expressed in the process of workplace selection. Physicians who choose to work in a staff-model HMO may value

desirable working conditions more than autonomy. Whereas, physicians who choose private practice may value autonomy over all other needs.

The physician as professional, worker and supplier perspectives provide insight into the range of physician "needs" that may be important in the formation of physician attitudes toward managed care tools (see Table 3-1. Comparing Needs Across Hoff's Three Views of Physicians). The desire for autonomy in providing care to patients is a need reflected by the physician as professional perspective. The professional perspective also suggests the need for protecting professional knowledge and protecting professional hierarchies. The physician as worker perspective suggests needs related to desirable working conditions, balance between work and free-time activities, social interaction, coping and resistance. The supplier perspective suggests needs related to productivity and reimbursement.

Table 3-1. Comparing Needs Across Hoff's Three Views of Physicians*

Worker View	Professional View	Supplier/Agent View
Desirable working conditions	Autonomy	Productivity
Work-life balance	Altruism	Maintaining or increasing reimbursement
Social Interaction	Protecting professional knowledge	
Coping and resistance	Protecting established hierarchies within profession	

* Adapted from Hoff (2001)

Need-satisfaction models are useful in that they provide a conceptual understanding for what physician characteristics (e.g., age, gender, specialty) should be included in models of physician attitudes. The major drawback of these models is that they lack recognition of the influence of social context in determining attitudes (Salancik and Pfeffer 1977). The SIP perspective indicates that in addition to making rational judgments about how a particular work situation meets their needs, workers are also influenced by social interactions with others in the workplace and their own past experiences and behavior (Salancik and Pfeffer 1978).

3.2 Social Information Processing (SIP) Approach to Job Attitudes

The social information processing perspective has yet to be applied to predicting physician attitudes, but it has been used in the general literature on job attitudes (Glisson and Durick 1988; Tett and Meyer 1993). This perspective adds another component to the process of attitude formation: social information. Social information includes perceptions about what others think and information about past behaviors of the subject. This type of information is generally gathered in the workplace and during social interaction with co-workers.

The social information processing approach to job attitudes is a modification of the general need-satisfaction models described previously. This approach is founded on the idea that people adapt their attitudes, behavior and beliefs in response to social influences within the workplace environment. The social environment does four major things, (1) it provides cues used to interpret events, (2) provides information about what attitudes and beliefs are appropriate or acceptable, (3) it makes information about a person's own past activities, statements and thoughts more or less salient, and (4) it communicates norms and expectations that constrain the process of interpreting those past activities. (Salancik and Pfeffer 1978)

Physicians experience social information through interactions with patients and other health care professionals throughout the daily process of conducting their work. There

are both formal and informal means by which these interactions occur (e.g., second-opinions, informal consultations with other physicians, conveying orders to nurses and other health care professionals). Because of the frequency of interaction within the clinic environment, it seems reasonable to hypothesize that physicians working in the same clinic have similar job-related attitudes because they share so much social information.

The social information processing perspective is useful because it sheds light on the social context of attitudes. However, it still lacks recognition of the formal organization outside of the immediate workplace. For physicians working outside a staff-model HMO, the workplace and MCO are separate entities, but MCOs may still play a role in how physicians perceive the managed care tools implemented by these organizations. In these situations, the relationship between physicians and MCOs may influence physician attitudes independently from the workplace.

3.3 Agency Theory

The fundamental issue addressed by agency theory is the potential conflict arising in the relationship between a principal (e.g., employer) and an agent (e.g., employee). Agency theory has been used to explain physician behavior related to financial incentives, but not physician attitudes (Pontes 1995). This thesis proposes that agency theory can be extended in two important ways. First, it may be useful in predicting physician job attitudes related to financial incentives. Second, it may be used to predict both attitudes

and behavior related to the other two forms of physician-directed managed care tools: rules/regulations and education/selection.

Agency theory was initially developed to describe the economic exchange of an owner and employee (Sharma 1997). Though the MCO-physician relationship is not the same as an owner-employee relationship, there are several parallels between them. First, MCOs provide much of the funding for health care but cannot directly provide that care. Therefore, MCOs must delegate the provision of that care to physicians just as an owner delegates responsibilities to an employee. One of the challenges that arise from this delegation of responsibility for care is that MCOs lack information about the patient's condition and what care should be given. This is called the asymmetry of information in agency theory. Care management and clinical guidelines are two of the ways that MCOs attempt to overcome the problem of information asymmetry. Another parallel with the principal-agent relationship is the tendency for both the MCO and physician to act in their own self-interest. While the idea of "self-interest" of the physician and MCO can be defined broadly to include whatever is deemed most important (e.g., quality of care, flexible work schedule, etc.), it is usually defined in agency theory as financial self-interest.

Of particular interest to this study is the emphasis that agency theory places on the relationship between the physician and the MCO. Managed care tools are MCOs way of

addressing the agency problem. The MCO attempts to create contractual relationships that provide the right mix of incentives to physicians to act in the interest of the MCO (e.g., contain costs while maintaining or improving quality of care).

Sharma (1997) considers the case of professionals acting as agents in the principal-agent relationship and argues that two unique attributes of professional work should be considered: knowledge power and social embeddedness. Knowledge power refers to the information asymmetry favoring the professional, which undermines the principal's ability to evaluate the professional's performance. In the case of physicians practicing in MCOs, the provision of "good" health care (or cost-effective or whatever the "goal" of the MCO is) does not always result in good outcomes for patients and the provision of "bad" health care does not always result in poor outcomes. Therefore, MCOs are relatively more challenged in the process of evaluating physicians than in the traditional principal-agent perspective (Sharma 1997). Social embeddedness refers to the idea that the influence of the medical profession limits two assumptions of agency theory: autonomy of the agent and the tendency of the agent to maximize self-interest at the expense of principals (Goode 1957). With respect to physicians, this means that physicians are trying to maximize the interest of their patients at the same time as they pursue their own financial reward.

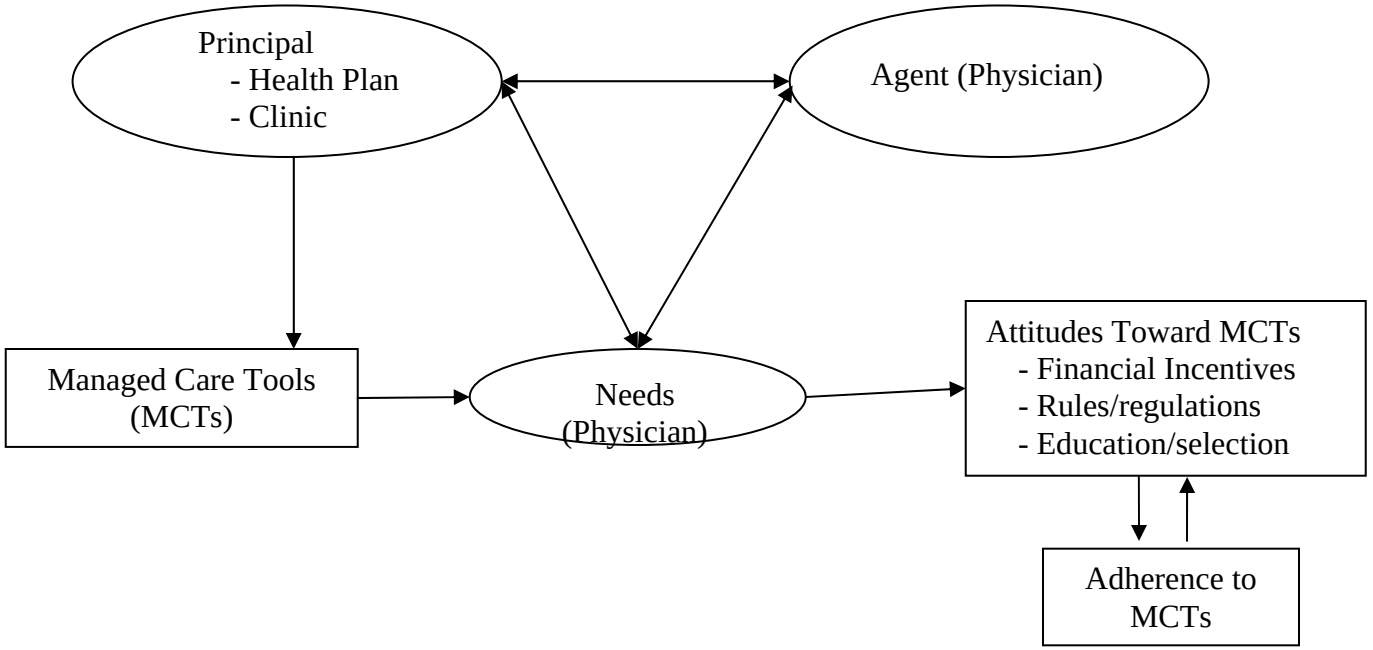
In summary, the social information processing perspective on job attitudes and agency theory are useful in describing physician's attitudes about managed care tools because they combine relevant theory on job attitudes and theory used to explain physician behavior. Integrating these two perspectives results in a more robust conceptual model that highlights important aspects of the formal organization (i.e., MCO and clinic) as well as the informal organization (i.e., social information).

3.4 Combined Theoretical Model

The conceptual model for this study is illustrated in Figure 3-1. This model incorporates aspects of the social information processing (SIP) perspective and agency theory. The bottom row of the model represents the SIP perspective and the 'principal'/'agent' triad represents the agency theory component of the model. Starting at the bottom-left, managed care tools (MCTs) are described as job/task characteristics in the SIP perspective. As physicians interact with MCTs, they establish a set of 'needs' that lead to the formation of 'attitudes toward MCTs.' 'Needs' can be described as filters through which physicians experience MCTs. Attitudes toward MCTs influence physician adherence (and adherence affects attitudes). Moving to the agency theory component of the model, the line between 'principal' and 'agent' represents the contract between physicians and the organizations in which they practice (health plans and clinics). Characteristics of MCTs are shaped by health plans and clinics in two ways: (1) providing social context described in the SIP perspective, and (2) direct manipulation of

the tools through the formal organization described in agency theory. Conflict arises between the health plans/clinics and physicians when MCTs do not align with physician 'needs'. Attitudes toward managed care tools are separated into three types based on mechanisms of control available to 'principals' in the process of contracting with 'agents'. The primary purpose of conceptual model development is to better understand physician 'adherence to MCTs'. This combined theoretical model can be used to create hypotheses about how changes to managed care tool implementation will affect physician adherence.

Figure 3-1. Combined Theoretical Model



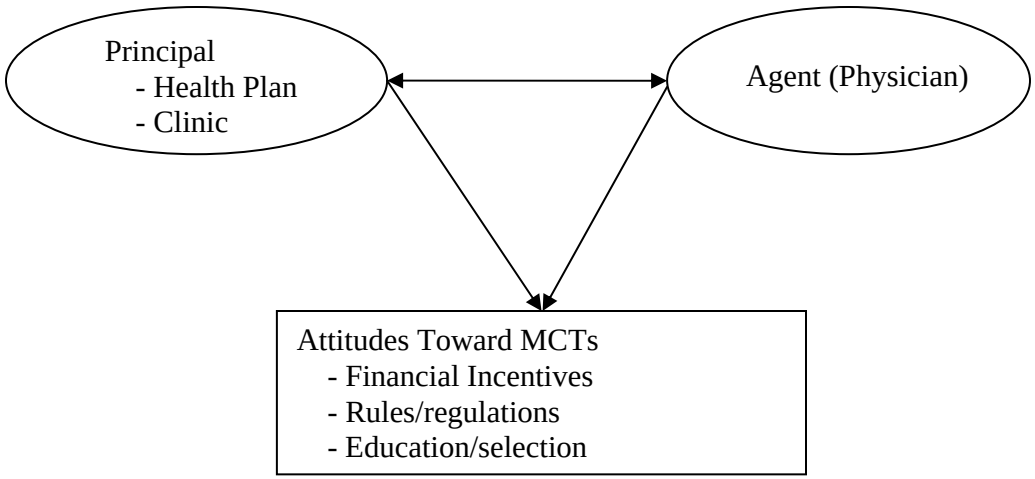
3.5 Analysis Model

The Analysis Model (Figure 3-2) illustrates the components of the combined theoretical model that can be tested with the PEHP data. In this model, the principal-agent relationship leads to attitudes toward the three types of managed care tools because 'needs' are not observed. 'MCTs' are not present because physician exposure to the tools is not observed.

Although data to test this entire model are not available, several important components of the model can be tested. First, the analysis model explains the importance of clinic and health plan ('principals') in determining physician attitudes toward managed care tools. Relative importance of each entity can be measured and descriptive characteristics can be used to further illustrate factors contributing to their impact on physician attitudes. Second, the analysis model explains the importance of the individual physician in determining their attitudes toward managed care tools. This relationship can be tested as well as the ability of individual physician characteristics to explain the relationship. Third, the utility of a control typology of managed care tools can be tested.

Components of the combined theoretical model that are absent from the analysis model include MCTs, 'needs (physician)' and physician behavior toward MCTs. Future research using additional data sources can build on the results of this analysis and help test components of the model that are not addressed in this study.

Figure 3-2. Analysis Model



Chapter 4. Methods

The following chapter provides descriptions of the data and analyses used in this study. All tables referenced in the following sections are located at the end of the chapter because they combine information discussed in multiple locations in the text.

4.1 PEHP Survey: Sampling and Data Collection

Data for this study come from the Physicians' Evaluation of Health Plans (PEHP) Project. The project is briefly described along with important details of the survey design and sampling process.

4.1.1 PEHP Project

The overall goal of the PEHP Project was to assess the physician perspective on health plan practices that promote or impede the delivery of high quality care. The Robert Wood Johnson Foundation funded a 4-year national pilot test of the PEHP survey instrument in five states across the country. Sites were selected based on managed care penetration, consolidation of health plans, and ability to identify partner organizations. For each site, partner organizations (business coalitions, Medicare, and Medicaid programs) were identified because of their role in purchasing insurance from health plans. Health plans were selected based on their volume of subscribers with these partner organizations. This study analyzes data collected by PEHP in 1998-99. (Smith, Bindman et al. 2001)

4.1.2 Physician Sample

The PEHP project surveyed a probability sample of physicians who were participating providers in 16 health plans in 5 areas nationwide. Survey sites include: Denver, CO and New York City, NY (business coalition sites); Pittsburgh/Philadelphia, PA (Medicare site); Miami, FL (Medicaid sites); and Seattle, WA (both Medicare and Medicaid sites). Physicians were randomly selected from provider lists with the goal of acquiring 300 respondents from each health plan. The total sample came to 4,800 plus 250 (5%) replacements or 5,050 physicians.

The sample for each plan was stratified to include 50% generalists and 50% specialists. Generalists included those providers with pediatrics, internal medicine, general practice, and family practice as their declared specialty in the provider lists. OB/GYN physicians were also considered generalists if the health plan from which they were sampled indicated that he/she was a primary care physician for that health plan. Specialists were defined as any specialty that did not fit into the PEHP definition of generalists. Hospital-based specialists (radiologists, anesthesiologists, pathologists, and emergency room physicians), as well as psychiatrists were excluded from the sample. Hospital-based specialists were excluded because previous interviews with such providers indicated that, in general, their experience with health plan policies and procedures was limited. Psychiatrists were excluded because mental health providers tend to have different

contracts with MCOs and the managed care tools (e.g., limitations on number of visits) used by health plans are different from other physicians.

Each physician was contacted by telephone and asked to complete a survey containing items on health plan quality and respondent characteristics. Respondents rated only that plan from which they were sampled. Most surveys were administered by telephone; however, a small proportion of physicians (<1%) requested that the survey be faxed to them for self-administration. Of 2,525 generalist physicians sampled, 1,758 responded (70%). Of 2,525 specialist physicians, 1,700 responded (67%). Due to an error in assignment of survey identification numbers, an additional physician completed a survey but could not be classified as generalist or specialist. The total possible analytic sample is 3,459 and the response rate is 68%.

4.1.3 Survey Design

The PEHP survey was derived from a previous telephone survey developed and refined by Borowsky and colleagues to measure physicians' assessment of the quality of care in health plans in the Minneapolis-St. Paul metropolitan area (Borowsky, Davis et al. 1997; Borowsky, Goertz et al. 1996; Smith, Bindman et al. 2001). The original instrument consisted of 104 items obtained through literature review, physician focus groups and interviews with medical directors and physician opinion leaders. Subsequent pilot tests and revisions resulted in a 43-item survey focusing on the quality of care in health plans.

Item response format consists of five choices ranging from “strongly agree to strongly disagree” and “excellent to poor.” (Smith, Bindman et al. 2001). (See Appendix B. PEHP Survey to view the survey instrument.)

4.2 Variables Used in Analyses

Physician attitudes toward managed care tools, demographics, some clinic characteristics and health plan model type were all present in the PEHP dataset. Additional clinic characteristics, additional health plan characteristics and item groupings for managed care tools were created for the purpose of these analyses.

4.2.1 Dependent Variables: Managed care tool scales

The PEHP survey contains a total of 32 attitudinal items. Seventeen of these items were dropped for the following reasons. (See Table 4-2 or Appendix B for item wording.) Five of the first six items (Q1, Q2a, Q2b, Q3, Q4) were dropped because they are general questions about managed care and the quality of care in individual health plans. These questions do not address attitudes about specific managed care tools. Q3_24 and Q4_24 are the same wording as Q3 and Q4 and these two items were dropped for the same reason as Q3 and Q4. Another five items (Q2c, Q15, Q24c, Q24d, Q24e) were dropped because these questions were intentionally not asked of all the respondents. Q7 and Q8 were dropped because they both ask physicians to report on information provided to patients (as opposed to physicians), which is outside the domain of physician-directed

managed care tools. Q18 and Q19 were dropped because they address peripheral components of authorizations. Namely, Q18 asks respondents to reflect on an arbitrary timeframe of 48 hours for processing authorization requests. Q19 asks about mechanisms for appeal of authorization decisions. In order for respondents to reflect on appeal procedures it requires that they experience a denial and attempt to appeal. Appeals are much less common than both authorization requests and denials. Therefore, use of this information should be limited to respondents who have attempted appeals (information not collected in this survey). Q24b was dropped because almost 40% of data are missing for this item. The large amount of missing data suggests that many physicians do not interact with case managers in their practice. Perhaps evaluation of case managers is best done by a select group of physicians.

The resulting 15 PEHP survey items were classified into three categories: (1) financial incentives (i.e., output control), (2) rules/regulations (i.e., behavioral control), and (3) education/selection (i.e., input control) based on Snell and Youndt's (1995) typology of organizational control (for item wording and control type classification see Table 4-1. Items in Managed Care Tool Scales; for descriptive statistics on the resulting control scales see Table 4-3. Scale Statistics for Managed Care Tool Scales). The financial incentives scale includes items that address pressure to disenroll sicker patients from the plan, importance of cost containment over quality of care, two items regarding access to specialty care. The rules/regulations scale includes three specific items about time

pressure and authorization policies along with two general items regarding negative repercussions and worse quality for sicker patients. The education/selection scale includes two feedback items ('preventive care' and 'practice patterns'), an item regarding clinical guidelines item, continuity of care and lab/radiology network. These item groupings were used to create the scales that serve as dependent variables in the HLM and linear regression analyses. The scales were created by calculating averages across each of the three item groupings.

Scale statistics for the managed care tool scales are presented in Table 4-3. Statistics in this table are based on the full sample (N = 3,459), and indicate the amount of missing data per item. In order to retain information from respondents with missing values, simple mean imputation was used (Schafer and Graham 2002). Averaging across multiple item scales allows respondents to be included in the scale score calculations when they respond to at least two-thirds (10/15) of the items in the scale. Cronbach's alpha for all three scales is greater than 0.70 indicating that the scales have high internal consistency. Scale correlations range from 0.55 for the financial incentives and rules/regulations scales to 0.63 for the rules/regulations and education/selection scale. All correlations are significant at the 0.01 level.

Factor loadings for a principal component analysis are presented in Table 4-4. Number of respondents vary by item in the factor analysis because it was conducted using the full

sample (N=3,459) with pairwise deletion of missing cases. All factor loadings are greater than 0.3 for hypothesized item groupings. However, seven items load on more than one scale (q9, q11, q12, q16, q17, q20 and q21) and one item ("Staff time getting authorizations") loads higher on education/selection than rules/regulations. There are at least two possible reasons for the observed overlap. First, the items were not written to test the typology of managed care tools described in this study. Future examinations of the managed care tool typology may result in better differentiation in factor loadings due to changes in wording, without any changes in the classification of managed care tools. Second, there may be some overlap in how managed care tools are implemented. This overlap may vary across health plans and practice settings. It may also vary over time. Future investigations of the managed care tool typology should address this overlap to determine in what settings scales can be combined without losing information. The "Staff time getting authorizations" item was retained because of the importance of authorization policies to the concept of rules/regulations. However, differentiation across scales would be stronger if the item were dropped.

4.2.2 Independent Variables: Physician, clinic and health plan characteristics

The analysis model proposes that physician attitudes about how managed care tools influence quality of care are a function of physician characteristics, clinic characteristics and health plan characteristics. The variables selected to represent physician, clinic and health plan characteristics are described below.

Physician characteristics include age and gender. (See Tables 4-5 and 4-6 for variable descriptions and frequencies). Age and gender were selected because they appear throughout the physician attitudes literature. Both variables come from items in the PEHP survey. Age groups are presented for the purpose of describing the variable distribution; however, age was used in analysis as a continuous variable. Gender is a dichotomous variable with female = 1 and male = 0.

Clinic characteristics include clinic size, proportion generalists (labeled "Specialty (clinic)"), predominant practice type (labeled "Practice type (clinic)"), and average number of denials in past 6 months (labeled "Denials (clinic)"). These variables were selected because they capture aspects of the formal organization and social context suggested by the conceptual model. Clinic assignments were created by matching existing address and phone number data in the health plan provider directories gathered by the PEHP project (for a detailed description of this process see Appendix C. Process of Creating Clinic Variable for HLM Analysis). Clinic size was calculated from this clinic assignment variable (See Table 4-7 for variable descriptions and frequencies) and is used as a predictor for the buffering effect of clinics on physician experience with managed care tools. Proportion of generalists is used because managed care tools are implemented differently for generalists and specialists. Predominant practice type is suggested by the literature as a measure of organizational structure of the clinic. Denials

(clinic) are used as a measure of the degree to which physicians within clinics feel that they are being managed.

Proportion of generalists ("Specialty (clinic)") and predominant practice type (Practice type (clinic)") were aggregated from items in the PEHP survey (see Table 4-7 for variable descriptions and frequencies). "Specialty (clinic)" was aggregated from a dichotomous physician level variable (1=generalist and 0=specialist) by calculating the mean within each clinic, resulting in proportion of generalists at the clinic level. Specialty was assigned to each respondent during sampling based on information from provider lists submitted by the health plans in the study. Due to the stratified sampling procedure used in the PEHP survey, the sample is half generalist and half specialist. "Predominant practice type (clinic)" was aggregated from an ordered categorical physician level variable (1=solo, 2=single specialty, 3=multi-specialty, 4=staff HMO). When 2 practice types were reported in equal numbers within a clinic, the higher numbered practice type was selected. While these variables were originally collected at the individual level, the data can be aggregated to the clinic level to represent characteristics of the work environment. Clinic level variables used in this study indicate the social context and impact of different policies of the formal organization.

"Denials (clinic)" was also aggregated from a physician-level item. The original item is open-ended and asks for the following information, "Within the past 6 months, how

many times has (insert plan name) denied coverage for services that you believe were medically necessary for your patients?" Responses range from zero to 720 in the full sample (N = 3,459) with 98.3% respondents at less than or equal to 20 denials. Because this distribution is very skewed, the item was truncated at 20 denials before aggregating to the clinic level and running the regression analyses. The purpose of truncation is to minimize the effect of outliers on the regression analyses. The cutoff of 20 denials was chosen for two reasons. First, it is an obvious cutoff point in the distribution of the data. Second, while it is reasonable to expect that some providers experience more than 20 denials in a six month period (slightly less than one denial a week), it is likely that those who experience more than this will change their authorization request behavior in response to repeated denials. Therefore, it is possible that the outliers (180-720 denials) are reflecting on something other than actual denials or they could be coding errors. Truncating the responses at 20 denials serves to minimize the effect of outliers when aggregating to the clinic-level.

Table 4-8 is a correlation matrix of physician and clinic level variables. The highlighted cells show correlations between the aggregated clinic level variables and the physician level variables from which they were aggregated. Correlations are all very high (>0.80) indicating that agreement among respondents in the same clinic is high.

Health plan characteristics include health plan model, market area, size of physician panel, and average number of denials in the past 6 months (see Table 4-9 for variable descriptions and frequencies). These variables were selected because they represent characteristics of the social context and formal organization at the health plan level. Health plan model information was taken from a 1998 published report on health plans from Interstudy (1997). These market areas for the PEHP project were specifically selected to represent diverse areas of the country. However, they are not representative of all MCOs throughout the United States.

At the health plan-level "Denials (HP)" may be described as a measure of health plan "managedness". This variable is similar to the clinic-level item of the same name except that it is averaged across each health plan. It attempts to measure the degree to which each MCO attempts to control utilization through authorizations and denials. As with the clinic-level variable, this variable was calculated from truncated data in order to minimize the effect of outliers.

4.3 Data Management

Among survey respondents (N=3,459) there were missing data in both the attitude items and demographic data. The data management approaches used to address these two types of missing data are described below.

4.3.1 Multiple Imputation of Missing Data for Attitude Items

Physician responses to the PEHP survey items contain a substantial amount of missing data, ranging from 10.7% to 39.7% (for item description and missing data see Tables 4-1. Items in Managed Care Tool Scales and 4-2. Items Dropped from Managed Care Tool Scales). In a previous iteration of the survey, Smith, Brown, Borowsky et al. (2001) conducted an analysis of the missing data. Little's test confirmed that the data were not missing completely at random (MCAR) (Little & Rubin, 1987). However, missing values did not vary by physician age, gender, percent of patients in the health plan, global job satisfaction, attitudes toward managed care, overall satisfaction as a plan provider, or satisfaction with amount of reimbursement from the plan. Rates of missing values varied only with health plan suggesting that the data were missing at random (MAR). This means the probability that a respondent missed an attitude item on the survey depended only on a variable (health plan) that was observed.

Based on findings of the missing data analysis, the expectation method (EM) algorithm was used to impute data for physicians with missing values using SPSS Missing Value Analysis software, version 7.5 (SPSS 1997). The EM algorithm is considered one of the best approaches for addressing missing data that meet the MAR assumption (Bernaards & Sijtsma 1999). This multiple imputation method used all items in the quality scales, physician demographics, job satisfaction, and general attitudes toward managed care items from the survey (see Appendix B. PEHP Survey). Imputed values were used for

the SEM and HLM analyses to avoid biased estimates (factor loadings and regression coefficients) caused by missing data (Patrician 2002). Approximately 9% of data were imputed for the SEM analysis and approximately 8% of data were imputed for the HLM analysis.

4.3.2 Missing Demographics and Clinic Characteristics

Demographic and clinic characteristic data were not part of the SEM analysis so missing values for these variables only impacts the HLM analysis. There are no missing data for gender (see Table 4-5. Sample Description. – two columns at right-hand side of table labeled: Full Sample (N=3,459)). One respondent is missing specialty data and less than one percent of the sample is missing age (N=14). The frequencies for three additional variables are presented in Table 4-5 for descriptive purposes only: "Denials (MD)", "Time with plan" and "Practice type (MD)". For the HLM analysis, "Denials (MD)" and "Practice type (MD)" are aggregated to the clinic level (see Table 4-7. Independent Variables for Clinic Level (N=1,184 clinics) in HLM Analysis.) Aggregation of these variables was done because of the study's focus on the role of clinics in determining physician attitudes toward managed care tools. The result of aggregation to the clinic level is that fewer respondents had missing data for these variables. Remaining respondents with missing demographic and clinic characteristic data were excluded from the analyses.

4.4 Sample Used in Analyses

Structural equation modeling (SEM) was conducted on the 15 attitude items in order to test the fit of the typology of managed care tools. Hierarchical linear modeling (HLM) was conducted using the managed care tool scales as dependent variables and physician demographics, clinic and health plan characteristics as independent variables to test the analysis model described in the previous chapter. HLM is used because nesting of physicians within clinics and health plans is a violation of classical independence assumptions for the linear model (Bryk and Raudenbush 1992). Different subsets of the original respondents (N=3,459) were used for the SEM and HLM analyses due to differences in missing data issues across the two types of analyses. The samples used for the SEM and HLM analyses are described below.

4.4.1 Sample Used in SEM Analysis

Health plans tend to focus more of their managed care tools on generalist physicians. Therefore, it is possible that generalists and specialists have different experiences with these tools. This observation suggests that separate SEM analyses should be run for generalists and specialists to allow for differences in their parameter estimates. After multiple imputation and dropping respondents with missing values for ten or less of the 15 attitude items used to create the attitude scales (financial incentives, rules/regulations and education/selection), the resulting N = 1,641 for generalists and N = 1,524 for specialists.

4.4.2 Sample Used in HLM Analysis

In the process of creating clinic-level variables for the HLM analysis (for description of process see Appendix C. Process of Creating Clinic Variable for HLM Analyis), it became clear that using phone numbers to assign physicians to clinics was preferable to using address data due to incomplete and inconsistent addresses in the provider directories. (See Table 4-10 for a description of sample loss). While some telephone numbers were missing in all the cleaned sampling files, New York was missing all telephone data and more than 70% of Washington physicians were missing telephone data. The loss of respondents when New York and Washington are dropped is 1,780 out of 3,459 due to the fact that it represents a loss of 9 health plans. Another 311 respondents were dropped because of identification number errors (N=19), missing age (N=5), specialty classification (N=1), denials at clinic-level (N=222), practice type at the clinic-level (N=16) and respondents missing more than two-thirds of attitude items (N=48). The final number of respondents for the HLM analysis is N=1,368.

4.5 Analysis by Specific Aim

Covariance structure models were used to test validity of the typology of managed care tools. This typology was used to justify the separation of physician attitudes into three groups: financial incentives, rules/regulations and education/selection. Scales based on these three types of managed care tools served as dependent variables in hierarchical

linear modeling. Results of hierarchical linear modeling address the two specific aims of this study. These analyses are described below.

4.5.1 Covariance Structure Models

Structural equation modeling (SEM) was used to test the control typology of managed care tools and establish validity of dependent variables. LISREL 8.80 (Jöreskog and Sörbom 2007) was used for conducting the SEM analysis. The goodness-of-fit of the multivariate model was determined by chi-square statistic and the root mean square error of approximation (RMSEA). The RMSEA is a commonly used measure of fit introduced by Steiger and Lind (1980) and supported by Kline (2005). An RMSEA value of 0.05 or less indicates a close fit of the model in relation to the degrees of freedom (Arbuckle 2005).

4.5.2 Hierarchical Linear Models

The nested structure of the data was modeled using multilevel analyses. Nested data violate an assumption of linear regression. Therefore, HLM was used because it is expected to calculate less biased regression coefficients than linear regression analysis. The statistical package used for multilevel analysis is HLM 6.08 (Raudenbush and Bryk 2009). Supporting analyses and data manipulations were conducted in PASW Statistics 18.0 (SPSS 2009). The first level of the HLM analysis corresponds to physicians (N =

1,368). The second level corresponds to clinics (N = 1,184) and the third level corresponds to health plans (N = 8).

Explanatory variables:

Level 1: Physician – age and sex

Level 2: Clinic – clinic size, proportion of generalists, time with plan, predominant practice type and average number of denials

Level 3: Health plan – model type, market area, average number of denials in past 6 months and panel size

A simple structure for the covariates was used for the HLM analysis. This means that no cross-level interactions were included in the models (Sullivan, Dukes, et al. 1999). The analysis includes two sets of three models (for a total of six three-level models). These two sets of models are described below.

The first set of HLM models provide results for the partitioning of variance across the three levels of the analysis (physician, clinic and health plan). The analysis includes the control scales as dependent variables (financial incentives, rules/regulations and education/selection) with no independent variables. This multi-level modeling technique allows variation in the dependent variables to be split among physicians, clinics and health plans, taking advantage of a critical feature of the data – that physicians within the same clinics and health plans may have similar attitudes about managed care tools. The information is used to compare the proportions of variance explained by the three levels

across the three dependent variables (financial incentives, rules/regulations and education/selection). This analysis addresses the second specific aim of the study.

> Specific Aim 2: To evaluate the relative importance of different layers of MCO's organizational structure (e.g., physicians, clinics and health plans) in explaining physicians' attitudes toward managed care tools.

The second set of HLM models includes the multilevel analysis in the first set along with the independent variables for the physician and clinic levels. This analysis addresses the first specific aim of this study.

> Specific Aim 1: To examine physician, clinic and health plan characteristics that lead to more positive and negative attitudes about managed care tools.

4.5.3 Linear Regressions

Linear regressions were conducted to obtain estimates for comparison with results of the hierarchical linear models. PASW Statistics 18.0 (SPSS 2009) was used to conduct the linear regressions and supporting analyses and data manipulations. Three separate regression analyses were performed, one for each of the three control scales (financial incentives, rules/regulations and education/selection). All physician, clinic and health plan level variables were included.

Table 4-1. Items in Managed Care Tool Scales

Scale	Item Label	Item Number	Item Wording	Response*	N (% missing)
Financial Incentives	Pressure to Disenroll	q9	I feel pressure from (insert plan name) to encourage my sicker patients to disenroll from the plan.	SA-SD	3006 (13.0)
	Cost First	rq12	I am not asked by (insert plan name) to put cost containment ahead of good patient care.	SD-SA	3087 (10.7)
	Specialist Access	rq20	Patients who really need to see a specialist are able to see one promptly.	SD-SA	3004 (13.1)
	Range of Specialists	rq22	The plan has the necessary range of specialists available for referral.	SD-SA	2987 (13.6)
Rules/ Regulations	Time Pressure	q5	The pressure to see a given number of patients in a day usually interferes with providing high quality patient care.	SA-SD	2971 (14.0)
	Fear Negative Repercussions	q13	I fear that if I criticize (insert plan name), there may be negative repercussions.	SA-SD	3064 (11.3)
	Worse Quality for Sick Patients	q14	(Insert plan name) allows me to provide high quality care for most patients, but not for those who are really sick.	SA-SD	3006 (13.0)
	Authorization Time	rq16	My staff spends a reasonable amount of office time obtaining authorizations from (insert plan name).	SD-SA	2897 (16.2)
	Authorization Policies	q17	The mechanism for obtaining authorizations in (insert plan name), interferes with providing high quality care.	SA-SD	2855 (17.4)

	Referral Delays	q21	Primary care physicians in (insert plan name) often delay specialty referrals longer than they should.	SA-SD	2956 (14.5)
Education/ Selection	Practice Patterns	rq6	(Insert plan name) provides accurate information to me to that compares my practice to that of my peers.	SD-SA	2826 (18.2)
	Guidelines	rq10	(Insert plan name)'s efforts to implement clinical guidelines have helped my patients to get better care.	SD-SA	2806 (18.8)
	Lab/Radiology	rq11	(Insert plan name)'s network of lab and radiology facilities allows me to provide high quality care to my patients.	SD-SA	2962 (14.3)
	Continuity of Care	rq23	The plan's administrative practices enhance continuity of care for my patients.	SD-SA	2740 (20.7)
	Preventive Care	rq24a	Letting you know which patients need preventive services (e.g., mammograms and immunizations).	P-E	2085 (39.7)

* All items have 5 point scales (1-5); SA=Strongly Agree; SD=Strongly Disagree; P=Poor; E=Excellent

Table 4-2. Items Dropped from Managed Care Tool Scales

Item Number	Item Wording	Response*	Reason
q1	Doctors are able to practice excellent medicine in managed care plans.	SA-SD	General managed care question
q2a	Based on your experience, please rate the overall quality of the following aspects of (insert plan name): clinical capability of primary care physicians	E-P	General health plan question
q2b	Based on your experience, please rate the overall quality of the following aspects of (insert plan name): clinical capability of specialist physicians	E-P	General health plan question
q2c	Based on your experience, please rate the overall quality of the following aspects of (insert plan name): adequacy of the formulary	E-P	Not asked in all sites
q3, q3_24	I would recommend (insert plan name) to a friend or family member.	SA-SD	General health plan question
q4, q4_24	I would recommend (insert plan name) to a friend or a family member who needed mental health care.	SA-SD	General health plan question
q7	(Insert plan name) provides accurate information to my patients on their benefits and the provider network.	SA-SD	Patient information question
q8	(Insert plan name) provides high quality education to patients about clinical issues such as prevention or specific health problems.	SA-SD	Patient information question
q15	(Insert plan name)'s policies and practices makes it difficult for me to provide high quality care for patients from minority backgrounds	SA-SD	Not asked in all sites
q18	Requests for authorizations are processed by (insert plan name) within 48 hours.	SA-SD	Peripheral authorization question
q19	(Insert plan name) provides timely and effective mechanisms to appeal authorization decisions.	SA-SD	Peripheral authorization question
q24b	Please rate these for (insert plan name): Providing case managers for patients with complex problems.	E-P	High missing data (almost 40%)
q24c	Please rate these for (insert plan name): Facilitating high quality care at the end of life.	E-P	Not asked in all sites
q24d	Please rate these for (insert plan name): Translator services	E-P	Not asked in all sites
q24e	Please rate these for (insert plan name): Providing transportation	E-P	Not asked in all sites

* All items have 5 point scales (1-5);
SA=Strongly Agree; SD=Strongly Disagree; P=Poor; E=Excellent

Table 4-3. Scales Statistics for Managed Care Tool Scales

Scale	# of Items	Range Min	Range Max	Mean* (SD)	Crohnbach's Alpha	N
Financial Incentives	4	1	5	3.72 (0.67)	0.71	3071
Rules/Regulations	6	1	5	3.56 (0.74)	0.80	3044
Education/Selection	5	1	5	3.13 (0.81)	0.77	2853

* A value for the scale was calculated if there were valid responses for at least two-thirds of the items in that scale

Table 4-4. Factor Analysis for Items in Managed Care Tool Scales

Managed Care Tool	Item Name	Component 1	Component 2	Component 3	N
Financial Incentives	Pressure to disenroll sick pts (q9)	-0.515	0.492	0.051	2953
	Not asked to put cost first (q12)	0.474	-0.331	0.244	3034
	See specialist promptly (q20)	0.460	-0.369	0.346	2956
	Necessary range of specs (q22)	0.837	0.110	0.145	2938
Rules/Regulations	See too many patients (q5)	0.114	0.731	-0.145	2912
	Fear negative repercussions (q13)	-0.151	0.652	-0.225	3010
	Bad care for sick pts (q14)	-0.210	0.647	-0.165	2950
	Staff time getting authoriz (q16)	0.065	-0.317	0.405	2842
	Authoriz mechs interfere w/care (q17)	-0.269	0.435	-0.347	2802
	PCPs delay referrals (q21)	-0.105	0.606	-0.303	2907
Education/Selection	Info to MDs on practice patterns (q6)	0.012	-0.085	0.786	2771
	Guidelines improve care (q10)	0.276	-0.154	0.718	2759
	Quality lab/radiology network (q11)	0.220	-0.387	0.541	2911
	Enhance continuity of care (q23)	0.216	-0.178	0.632	2693
	Flag pts for preventive care (q24a)	0.028	-0.211	0.716	2052

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
Rotation converged in 5 iterations.
Pairwise deletion of missing values

Table 4-5. Sample Descriptions for SEM and Full Sample

Item Label	Item Wording	Characteristic	SEM Generalists (N=1641) Number	SEM Generalists (N=1641) Percent or Mean (SD)	SEM Specialists (N=1524) Number	SEM Specialists (N=1524) Percent or Mean (SD)	Full Sample (N=3459) Number	Full Sample (N=3459) Percent or Mean (SD)
Age	Age: ___ ___ years old	≤ 40 years	484	29.5%	298	19.6%	846	24.5%
		41-49 years	595	36.3%	620	40.7%	1326	38.3%
		≥ 50 years	557	33.9%	599	39.3%	1273	36.8%
		Missing	5	0.3%	7	0.5%	14	0.4%
		Range	29-89	46.4 (9.2)	30-78	47.7 (7.9)	29-89	47.1 (8.7)
Gender (female)	Gender: 1 = female, 0 = male	Female	491	29.9%	194	12.7%	757	21.9%
		Male	1150	70.1%	1329	87.2%	2701	78.1%
		Missing	0	0%	1	0%	0	0%
Specialty (general)	Coded from provider directory information based on PEHP definition of general/specialty	Generalists	1641	100%			1758	50.8%
		Specialists			1524	100%	1700	49.1%
		Missing					1	0%
Denials (MD)	Within the past 6 months, how many times has (plan) denied coverage for services that you believe were medically necessary for your patients?	Range	0-20	1.2 (3.1)	0-20	1.7 (4.1)	0-20	1.6 (3.7)
		Missing	233	14.2%	272	17.8%	711	20.6%
Time with plan	How long have you practiced with this plan?	Range	1-50	7.3 (6.2)	1-40	8.3 (6.1)	1-50	7.7 (6.3)
		Missing	189	1.2%	279	18.3%	682	19.7%
Practice type (MD)	What best describes the majority of your practice?	Solo	266	16.2%	193	12.7%	490	14.2%
		Single specialty group	512	31.2%	652	42.8%	1312	37.9%
		Multi-specialty group	478	29.1%	489	32.1%	1053	30.4%
		Staff HMO	356	21.7%	167	11.0%	523	15.1%
		Missing	29	1.8%	23	1.5%	81	2.3%

Table 4-6. Sample Description for HLM and Full Sample

Item Label	Item Wording	Characteristic	HLM (N=1368) Number	HLM (N=1368) Percent or Mean (SD)	Full Sample (N=3459) Number	Full Sample (N=3459) Percent or Mean (SD)
Age	Age: ___ ___ years old	≤ 40 years	341	24.9%	846	24.5%
		41-49 years	534	39.0%	1326	38.3%
		≥ 50 years	493	36.0%	1273	36.8%
		Missing	0	0.0%	14	0.4%
		Range	29-83	46.9 (8.8)	29-89	47.1 (8.7)
Gender (female)	Gender: 1 = female, 0 = male	Female	274	20.0%	757	21.9%
		Male	1094	80.0%	2701	78.1%
Specialty* (general)	Coded from provider directory information based on PEHP definition of general/specialty	Generalists	721	52.7%	1758	50.8%
		Specialists	647	47.3%	1700	49.1%
		Missing	0	0	1	0%
Denials*	Within the past 6 months, how many times has (plan) denied coverage for services that you believe were medically necessary for your patients?	Range	0-20	1.6 (3.7)	0-20	1.6 (3.7)
		Missing	49	3.6%	711	20.6%
Time with plan*	How long have you practiced with this plan?	Range	1-50	7.2 (5.7)	1-50	7.7 (6.3)
		Missing	153	11.2%	682	19.7%
Practice type* (MD)	What best describes the majority of your practice?	Solo	200	14.6%	490	14.2%
		Single specialty group	640	46.7%	1312	37.9%
		Multi-specialty group	286	20.9%	1053	30.4%
		Staff HMO	238	17.4%	523	15.1%
		Missing	4	0.3%	81	2.3%

*Variables not included in hierarchical linear models at physician level

Table 4-7. Independent Variables for Clinic Level (N=1184 clinics) in HLM Analysis

Variable Description	Variable Label	Item Wording	Characteristic	Number	Percentage or Mean (SD)
Number of physicians in clinic	Clinic size	Calculated from original provider directories	1 2 thru 10 >10 Range:	605 552 27 1-375	51.1% 46.7% 2.3% 3.03 (11.59)
Percent of physicians in clinic who are generalists	Specialty (clinic)	Aggregated from 'Specialty' variable	0% 1-99% 100%	552 12 620	46.6% 1.0% 52.4%
Predominant practice type	Practice type (clinic)	Aggregated from survey item: What best describes the majority of your practice?	Solo Single specialty group Multi-specialty group Staff HMO	187 519 260 218	15.8% 43.8% 22.0% 18.4%
Average number of denials in past 6 months (clinic)	Denials (clinic)	Aggregated from survey item; Within the past 6 months, how many times has (insert plan name) denied coverage for services that you believe were medically necessary for your patients?	Range:	0-20	1.52 (3.63)

Table 4-8. Correlation Matrix for HLM Sample (N=1368)

				Practice Type (MD)						Practice Type (clinic)			
Item Labels	**Age**	**Specialty (MD)**	**Time w/plan (MD)**	**Solo**	**Single spec**	**Multi-spec**	**Staff HMO**	**Denials (MD)**	**Specialty (clinic)**	**Solo**	**Single spec**	**Multi-spec**	**Staff HMO**
Age													
Specialty (MD)	-0.08*												
Time w/ plan (MD)***	0.40**	-0.13**											
Practice type (MD)***													
Solo practice	0.18**	0.08*	-0.01										
Single spec group	-0.04	-0.16**	-0.02	-0.39**									
Multi-spec group	0.00	-0.02	-0.04	-0.21**	-0.48**								
Staff HMO practice	-0.11**	0.15**	0.07	-0.19**	-0.43**	-0.24**							
Denials (MD)***	-0.08*	-0.04	-0.01	0.12**	0.05	-0.03	-0.15**						
Specialty (clinic)	-0.07*	0.99**	-0.13**	0.09*	-0.16**	-0.01	0.14**	-0.04					
Practice type (clinic)													
Solo practice	0.18**	0.08*	-0.01	0.97**	-0.38**	-0.21**	-0.19**	0.10**	0.08*				
Single spec group	-0.01	-0.17**	-0.01	-0.34**	0.90**	-0.42**	-0.41**	0.05	-0.17**	-0.36**			
Multi-spec group	-0.03	0.01	-0.04	-0.23**	-0.37**	0.84**	-0.21**	-0.01	0.01	-0.23**	-0.51**		
Staff HMO practice	-0.11**	0.14**	0.07*	-0.19**	-0.42**	-0.21**	0.96**	-0.15**	0.14**	-0.18**	-0.41**	-0.26**	
Denials (clinic)	-0.06*	-0.04	-0.01	0.11**	0.05	-0.03	-0.15**	0.94**	-0.04	0.10**	0.05	0.00	-0.16**

* Pearson Correlations are significant at the 0.05 level (2-tailed)

** Pearson Correlations are significant at the 0.01 level (2-tailed)

*** Items included for descriptive purposes only, not included in HLM analyses

Shaded cells indicate correlations between aggregated clinic-level items and their corresponding physician-level item

Pairwise Deletion of missing cases

Table 4-9. Independent Variables for MCO Level (N=8 health plans) in HLM Analysis

Variable Description	Variable Label	Item Wording	Characteristic	Number	Percentage or Mean (SD)
MCO model type	HP model	Variable assigned at time of sampling	IPA Network/Mixed Group/Staff	5 2 1	
MCO market area	HP market area	Variable assigned at time of sampling	Pennsylvania Florida Colorado	2 3 3	
Average number of denials in past 6 months (health plan)	Denials (HP)	Aggregated from survey item; Same as Clinic/Medical Group variable described above but aggregated to MCO level	Range:	0.53-3.57	1.96 (1.15)
Number of physicians in panel (provider directories)	HP size	Information taken from provider directories	Range:	915-4528	1993 (1250)

Table 4-10. Description of Sample Loss for Hierarchical Linear Modeling (HLM)

Reason	N lost	Resulting N
Market areas (WA & NY) dropped due to missing phone data	1780	1679
Out-of-range ID	1	1678
Fail to match ID to sampling files	18	1660
Missing age (physician-level)	5	1655
Missing specialty (clinic-level)	1	1654
Missing denials (clinic-level)	222	1432
Missing practice type (clinic-level)	16	1416
Missing >10 (out of 15) attitude items	48	1368

Chapter 5. Results

The following chapter describes respondent groups used and results of SEM and HLM analyses conducted in this study. Sample descriptions illustrate how the respondent groups compare to the original physician sample. Results of the SEM analysis are presented separately for generalists and specialists. SEM results are followed by description of two types of HLM analyses: (1) proportion of variance explained for each of the managed care tool scales (with no independent variables), and (2) hierarchical modeling with independent variables regressed on the managed care tool scales. The next section describes results of three linear regressions where each of the three managed care tool scales serve as dependent variables and all the physician, clinic and health plan level variables (described previously) are entered as independent variables. This step is intended to provide estimates for comparison with results of the HLM analysis.

5.1 Sample Descriptions

Sample descriptions are presented in Tables 4-5 and 4-6. Table 4-5 presents generalists and specialist frequencies separately for the two samples used in SEM and the full sample (N=3,459). Table 4-6 presents frequencies for the HLM sample and the full sample (N=3,459). The full sample (N=3,459) is repeated in Table 4-6 for the purpose of comparison to the HLM sample.

5.1.1 Sample Used for Structural Equation Modeling (SEM)

SEM was conducted separately for generalists and specialists to allow factor loadings and correlations to vary between the two groups. After multiple imputation sample size for generalists is N = 1,641 and for specialists is N = 1,524. These sample sizes represent a loss of 117 respondents for generalists and a loss of 276 respondents for specialists. All sample loss is due to missing values on more than ten of the 15 attitude items.

Age distributions of respondents used for SEM are similar to the original sample (N=3,459) except that specialists have a slightly smaller proportion of respondents in the youngest age group (i.e., $\leq$40 years old). One fifth of the original sample (N=3,459) is female, but the ratio of males to females is slightly higher for generalists and slightly lower specialists. The average number of reported denials for generalists and specialists are similar to the original sample. Generalists are more heavily weighted toward staff HMO practices than specialists.

5.1.2 Sample Used for Hierarchical Linear Modeling (HLM)

HLM analyses were conducted on imputed data but limited to respondents with complete physician, clinic and health plan characteristic data. Table 4-10 shows the number of respondents lost for each of the missing data issues. Only 48 respondents were lost due to missing values for more than ten of the 15 attitude items, which is less than the sample loss for SEM analysis (N=393) because it was the last criteria applied. The resulting number of respondents for the HLM analysis is N = 1,368.

Table 4-6 shows characteristics of the HLM sample compared to the full sample. Age distributions for the HLM sample are similar to that of the full sample. Approximately one third of respondents are in each of the three age categories ($\leq$40, 41-49 and $\geq$50 years). One fifth of the full sample is female and the gender distribution is similar in the HLM sample. With regard to the ratio of generalists to specialists, the HLM sample is approximately the same as the full sample reflecting the stratified sampling procedure used by the PEHP project of half generalists and half specialists. The average number of reported denials and time with plan are similar between the two samples.

5.2 Results of Structural Equation Modeling (SEM)

The first SEM models analyzed for generalists and specialists allowed for correlation among the latent variables (financial incentives, rules/regulations and education/selection) and relationships between the latent variables and attitude items according to hypothesized item groupings. All error covariances were fixed to zero. Goodness of fit indices indicate that these models did not fit the data well (chi-square = 648.19, df = 87, RMSEA = 0.063, 90% CI for RMSEA: 0.058 – 0.067 for generalists and chi-square = 860.70, df = 87, RMSEA = 0.076, 90% CI for RMSEA: 0.072 – 0.081 for specialists). Both models suggested addition of correlated errors between sets of items with obvious wording similarities (positively worded items, negatively worded items and items asked together: q5 – q6, q8 – q14, q16 – q17, q20 – q23). (See Appendix B. PEHP Survey for these item groupings.) To improve fit of the models, errors were allowed to

correlate freely if they were identified in the analysis (with high modification indices) and fit into one of the three categories of wording similarities described above. Results of the final models are presented in Figure 5-1 and 5-2. Factor loadings in the SEM results are different from those reported for the factor analysis (Table 4-4) because SEM fixes cross-loadings at zero. This means that in SEM indicators are not allowed to load on other factors unless explicitly stated in the model. In contrast, factor analysis allows indicators to load on all factors in the model and the solution is rotated to maximize the size of primary loadings and minimize cross-loadings (Brown 2006).

5.2.1 Generalists

The chi-square statistic for the generalist model presented in Figure 5-1 is 295.35 ($p = 0.00$, $df = 67$). An RMSEA of less than 0.05 indicates a good fit of the model (Arbuckle 2005). The RMSEA of 0.046 (90% CI: 0.040 - 0.051) for the generalist model indicates a close fit. The latent variable correlation matrix for this model indicates a correlation between financial incentives and rules/regulations of 0.90 ($p=0.02$), while the other two correlations (financial incentives - education/selection and rules/regulations - education/selection) are 0.74 ($p<0.04$). These correlations indicate that there is substantial overlap in the latent variables. Results of the factor analysis are consistent with this finding, where several items load on more than one factor. Removing items from the model that load highest on multiple scales (q9, q16, q17) would be likely to decrease the latent variable correlations and increase model fit. However, these items

were not dropped because it isn't clear whether the overlap is due to item wording problems (i.e., measurement error) or actual overlap in the concepts measured.

5.2.2 Specialists

The chi-square statistic for the specialist model presented in Figure 5-2 is 334.91 ($p = 0.00$, $df = 62$). The RMSEA of 0.054 (90% CI: 0.048 – 0.059) indicates that the model does not fit as closely for specialists as for generalists. The latent variable correlation matrix for this model indicates correlations ranging from 0.81 to 0.86 ($p<0.03$). Similar to the generalist model, these correlations indicate substantial overlap between the latent variables. Several factor loadings for specialists are different from the generalist model. Namely, the factor loading for one item ("range of specialists") is larger for generalists. Loadings for five items ("specialist access", "time pressure", "fear negative repercussions", "referral delays", and "continuity of care") are all larger for specialists.

Based on results of the confirmatory factor analysis and good model fit of the SEM for generalists, managed care tool scales were calculated for all respondents in the study using a mean of the items in each scale. Due to multiple imputation, there was no missing data in the calculations but respondents missing 10 or more of the 15 attitude items were dropped from the sample used for analysis. The resulting scales have means and standard deviations that are similar to those calculated for the original sample (see Table 4-3. Scale Statistics for Managed Care Tool Scales). The mean and (standard

deviation) is 3.82 (0.66) for financial incentives, 3.35 (0.08) for rules/regulations and 3.09 (0.79) for education/selection.

5.3 Results of Hierarchical Linear Modeling (HLM)

Two sets of three HLM analyses were conducted. The first set of three models is presented in Table 5-1 and provides results for proportion of variance explained at each level (i.e., physician, clinic and health plan) across the three types of managed care tools. Models with no independent variables are the best source of proportion of variance estimates because these estimates are sensitive to the variables included in the model (Raudenbush, Bryk, et al. 2004). The second set of three models is presented in Tables 5-2, 5-3 and 5-4. These tables give results for the three level models with independent variables for each of the three types of managed care tools (financial incentives, rules/regulations and education/selection, respectively).

5.3.1 Proportion of Variance Explained at Each Level

The proportion of variance explained at the physician level ranges from 64.8% for education/selection to 86.1% for financial incentives (Table 5-1). This represents the bulk of the variation for all three types of managed care tools. Variance explained at the clinic level is not statistically significant for financial incentives ($p=0.28$). For the rules/regulations scale, 8.2% ($p=0.013$) of variance is explained at the clinic level and for the education/selection scale it is 17.4% ($p<0.001$). Proportion of variance explained at

the health plan level ranges from 11.5% for the financial incentives scale to 17.9% for the education/selection scale ($p<0.001$).

5.3.2 Three-level Models with Independent Variables

Tables 5-2, 5-3 and 5-4 show results for the three level models with independent variables. Because of the small number of units at the health plan level (N=8), not all health plan level predictors could be included in the analysis. Two variables were dropped: health plan size and Denials (HP). Health plan size was dropped because it is not a statistically significant predictor for any of the three managed care tool scales in any previous analyses (e.g., see results of linear regression analyses in Tables 5-5, 5-6 and 5-7). Denials (HP) was dropped because there is a substantial amount of overlap between this variable and the indicators for health plan market area ('Colorado' and 'Pennsylvania') and health plan model ('IPA Model plan' and 'Network/mixed plan').

The overlap between 'Denials (HP)' and the combination of health plan market are and health plan model indicators results in a collinearity problem, indicating that some items need to be dropped or combined in order to estimate accurate coefficients for health plan level variables (Mason and Perreault 1991). Mason and Perreault (1991) describe options for combining collinear variables in order to retain information. However, the small drop in total R-square when 'Denials (HP)' is dropped (less than 2% for all three managed care tool scales) suggests that very little information is lost when this item is dropped. Another option was to keep the 'Denials (HP)' variable and drop the market area and

health plan model indicators. This option was not chosen because average number of denials is already included in the models at the clinic level and because there is more supporting literature for health plan model and market area variables than for average number of denials at the health plan level (Borowsky, Davis, et al. 1997; Chehab, Panicker, et al. 2001).

Physician level variables (age and gender) are not statistically significant predictors of the three managed care tool scales ($p>0.05$; see Tables 5-2, 5-3 and 5-4). This result is not surprising considering the findings regarding these variables in the literature (Borowsky, Davis, et al. 1997; Chehab, Panicker, et al. 2001; Reschovsky, Reed, et al. 2001). In the two studies where age and gender differences were identified, the effects were quite small (Feldman, Novak, et al. 1998; Halm, Causino, et al. 1997). Clinic size is also a poor predictor of all three managed care tool scales ($p>0.3$; see Tables 5-2, 5-3 and 5-4). This finding is consistent with the one study that included this variable in the prediction of physician attitudes toward managed care practices (Williams, Zaslavsky, et al. 1999).

Clinic specialty and average number of denials are statistically significant ($p<0.04$) for all three managed care tool scales. Clinics with a higher proportion of generalists have more positive attitudes toward managed care tools (see section 4.2.2 for variable definition). This finding supports the literature that shows significant differences in attitudes between generalists and specialists (Borowsky, Davis, et al. 1997; Chehab, Panicker, et al. 2001; Reschovsky, Reed, et al. 2001). Looking at the differences in the size of coefficients

across the three analyses (see statistics for 'Specialty (clinic)' in Tables 5-2, 5-3, and 5-4), results indicate that specialty differences are largest for education/selection and smallest for financial incentives. The coefficient for average number of denials is negative indicating that higher number of denials is associated with more negative attitudes toward managed care tools.

With regard to practice type, coefficients for 'solo practice' and 'single-spec group' are statistically significant for all three scales ($p<0.02$; see Tables 5-2, 5-3 and 5-4). The coefficient for 'multi-spec group' is statistically significant for financial incentives and education/selection scales ($p<0.007$), but not for rules/regulation ($p>0.05$). Coefficients for practice type are negative and approximately the same within the financial incentives and education/selection scales indicating that attitudes toward managed care tools are more negative for non-staff HMO respondents than staff-HMO respondents. For rules/regulations, solo practice is associated with the most negative attitudes and staff HMO is associated with the most positive (or least negative) attitudes. The coefficient for solo practice is larger than single-specialty group indicating that physicians in solo practice are substantially more negative about rules/regulations than physicians in the other three practice types (see statistics for 'Solo practice' and 'Single spec group' in Table 5-3). This finding is consistent with practice characteristic differences found by Reschovsky, Reed, et al. (2001). But the lack of variation between 'Solo practice' and other non-staff practice types evident in the financial incentives and education/selection

scales (Tables 5-2 and 5-4) shows that importance of practice type varies across managed care tool scales.

Health plan market area and model type indicators are all statistically significant predictors of the education/selection scale ($p<0.05$; see statistics for 'Colorado' and 'Pennsylvania', 'IPA model plan' and 'Network/mixed plan' in Tables 5-4). The coefficients are negative indicating that Colorado and Pennsylvania respondents have more negative attitudes toward education/selection than Florida respondents and IPA and network/mixed respondents have more negative attitudes than respondents in group/staff plans.

The results for health plan market area and model type are somewhat different for financial incentives and rules/regulations (Tables 5-2 and 5-3). The market area coefficients ('Colorado' and 'Pennsylvania') for financial incentives are not statistically significant ($p>0.07$). For rules/regulations, the coefficients for 'Colorado' and 'Pennsylvania' are both relatively large and negative, but only 'Colorado' reaches statistical significance ($p=0.048$). Therefore, the only market area differences for the rules/regulations scale are that Colorado respondents have more negative attitudes than Florida respondents. For health plan model type, 'IPA model plan' is a statistically significant predictor of the financial incentives scale ($p=0.002$; Table 5-2). The coefficient is relatively large and negative indicating that physicians in IPA plans have more negative attitudes toward financial incentives than respondents in other health plan

types. Health plan model indicators are not statistically significant for the rules/regulations scale (Table 5-3). Results of the health plan level predictors shows that importance of health plan market area and health plan model type varies across managed care tool scales.

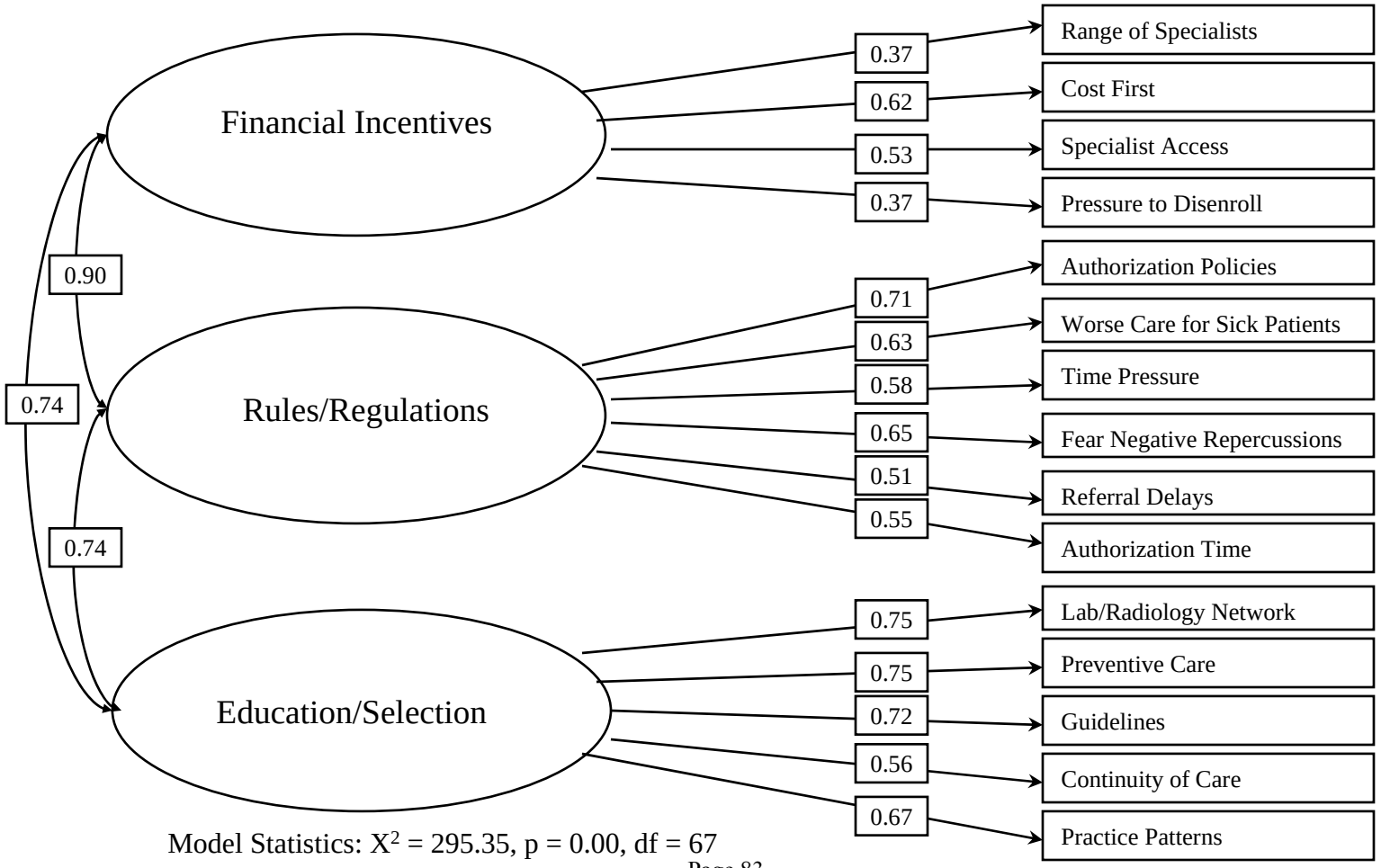
5.4 Comparison of HLM and Linear Regression Analyses

The linear regression models provide estimates of coefficients to compare with results of the HLM analysis to assess utility of HLM with these data. HLM is described as superior to linear regression for nested data because nesting violates a basic assumption of the linear model. Results of the linear regression where all physician, clinic and health plan level predictors are regressed on the financial incentives scale are presented in Table 5-5. Results of the same set of independent variables regressed on the rules/regulations and education/selection scales are presented in Tables 5-6 and 5-7, respectively.

Comparison of estimates between corresponding linear regressions and HLM analyses indicates that the two regression procedures yield similar results (see Tables 5-2, 5-3 and 5-4 for HLM estimates and Tables 5-5, 5-6 and 5-7 for linear regression estimates). 'HP Size' was included in the linear regressions to show the lack of significance of this variable across the three types of managed care tools. Due to the small number of units at the health plan level (n=8 health plans), it was necessary to drop 'HP Size' from the HLM analysis. Coefficients for the other predictors are similar in size across the two types of analyses. The only substantive differences are found in statistical significance of

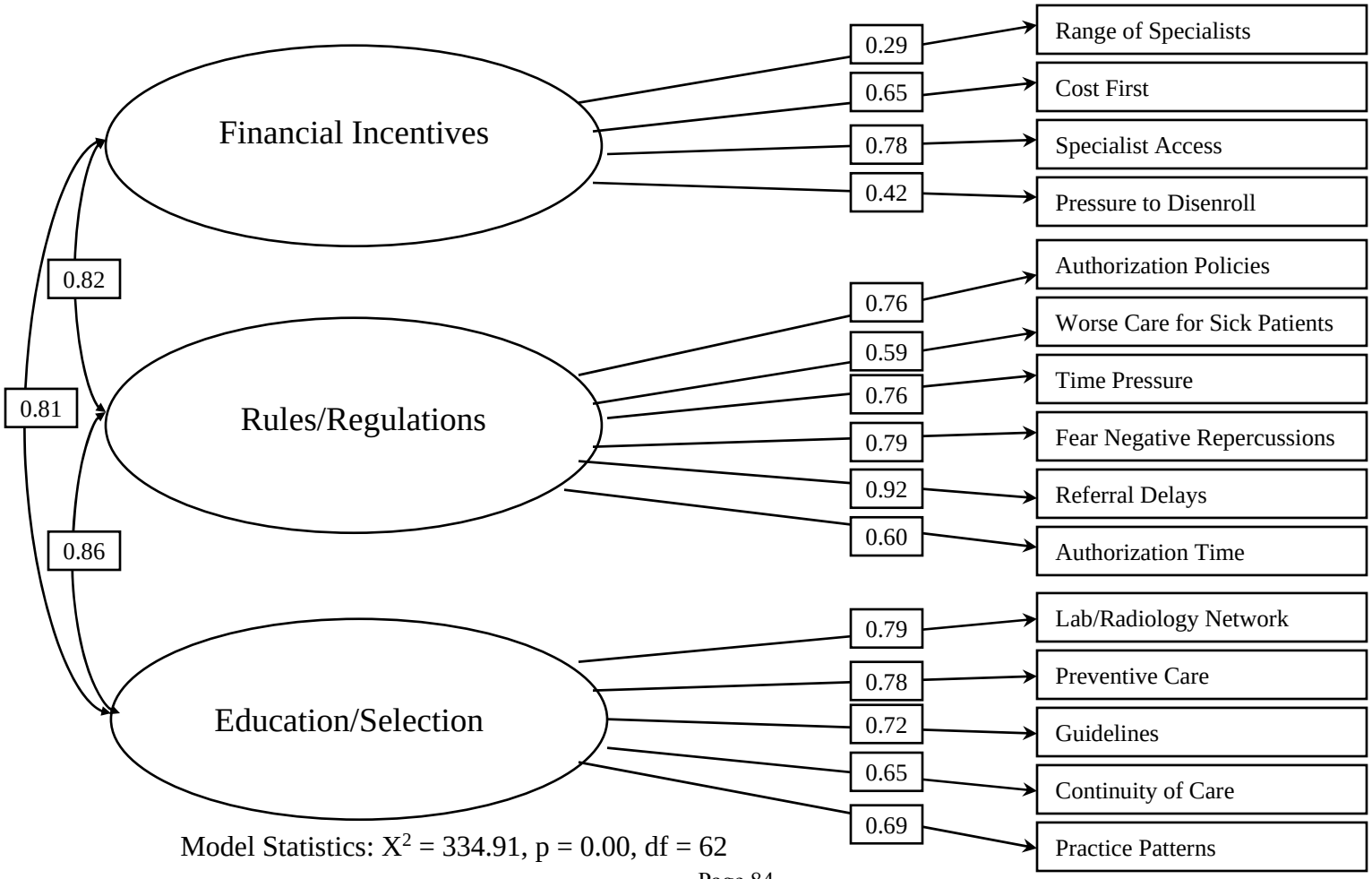
health plan level predictors in the financial incentives and rules/regulations models. For financial incentives, the coefficients for ‘Colorado’ and ‘Network/mixed plan’ are only statistically significant in the linear regression (comparing Tables 5-2 and 5-5). For rules/regulations, the coefficients for ‘Pennsylvania’, ‘IPA model plan’ and ‘Network/mixed plan’ are only statistically significant in the linear regression (comparing Tables 5-3 and 5-6).

Figure 5-1. Results of Structural Equation Modeling for Generalists (N=1641)



Model Statistics: $X^2 = 295.35$, $p = 0.00$, $df = 67$

Figure 5-2. Results of Structural Equation Modeling for Specialists (N=1524)



Model Statistics: $X^2 = 334.91$, $p = 0.00$, $df = 62$

Table 5-1. Proportion of Variance Explained at Each Level of HLM Analysis (N=1368)

Dependent Variable	Level of Analysis	Variance Component	SE	P-value	Prop of Variance Explained
Financial Incentives	Physician	0.3650	0.0308		86.1%
	Clinic	0.0103	0.0276	0.284	2.4%
	Health Plan	0.0488	0.0257	0.000	11.5%
Rules/ Regulations	Physician	0.4894	0.0467		77.8%
	Clinic	0.0517	0.0438	0.013	8.2%
	Health Plan	0.0880	0.0459	0.000	14.0%
Education/ Selection	Physician	0.3986	0.0423		64.8%
	Clinic	0.1068	0.0418	0.000	17.4%
	Health Plan	0.1101	0.0569	0.000	17.9%

Table 5-2. Three-level HLM Predicting Physicians Attitudes Toward Financial Incentives (N=1368)

Level of Analysis	Fixed Effect	Coefficient	SE	T-ratio	df	P-value
Physician	Age	-0.002	0.002	-1.162	1304	0.246
	Gender (female)	-0.054	0.042	-1.272	1304	0.204
Clinic	Clinic size	0.000	0.000	0.039	1177	0.969
	Specialty (clinic)	0.079	0.034	2.316	1177	0.021
	Practice type (clinic)					
	Solo practice	-0.219	0.077	-2.828	1177	0.005
	Single spec group	-0.191	0.069	-2.777	1177	0.006
	Multi-spec group	-0.188	0.070	-2.685	1177	0.008
	Staff HMO*					
	Denials (clinic)	-0.060	0.005	-12.747	1177	0.000
Health Plan	HP market area					
	Colorado	-0.114	0.045	-2.524	3	0.077
	Pennsylvania	0.070	0.050	1.417	3	0.251
	Florida*					
	HP model					
	IPA model plan	-0.425	0.076	-5.560	3	0.002
	Network/mixed plan	-0.147	0.075	-1.947	3	0.140
	Group/staff plan*					

*Comparison group

Table 5-3. Three-level HLM Predicting Physicians Attitudes Toward Rules/Regulations (N=1368)

Level of Analysis	Fixed Effect	Coefficient	SE	T-ratio	df	P-value
Physician	Age	-0.002	0.002	-0.701	1304	0.483
	Gender (female)	-0.037	0.050	-0.741	1304	0.459
Clinic	Clinic size	0.000	0.001	-0.901	1177	0.368
	Specialty (clinic)	0.134	0.040	3.323	1177	0.001
	Practice type (clinic)					
	Solo practice	-0.551	0.092	-5.998	1177	0.000
	Single spec group	-0.199	0.082	-2.436	1177	0.015
	Multi-spec group	-0.162	0.083	-1.938	1177	0.052
	Staff HMO*					
	Denials (clinic)	-0.065	0.006	-11.789	1177	0.000
Health Plan	HP market area					
	Colorado	-0.429	0.104	-4.116	3	0.048
	Pennsylvania	-0.431	0.111	-3.893	3	0.060
	Florida*					
	HP model					
	IPA model plan	-0.244	0.156	-1.565	3	0.214
	Network/mixed plan	-0.228	0.156	-1.462	3	0.239
	Group/staff plan*					

*Comparison group

Table 5-4. Three-level HLM Predicting Physicians Attitudes Toward Education/Selection (N=1368)

Level of Analysis	Fixed Effect	Coefficient	SE	T-ratio	df	P-value
Physician	Age	0.004	0.002	1.850	1304	0.064
	Gender (female)	0.048	0.049	0.989	1304	0.323
Clinic	Clinic size	0.000	0.001	-0.234	1177	0.815
	Specialty (clinic)	0.243	0.039	6.153	1177	0.000
	Practice type (clinic)					
	Solo practice	-0.352	0.090	-3.914	1177	0.000
	Single spec group	-0.350	0.080	-4.371	1177	0.000
	Multi-spec group	-0.300	0.082	-3.676	1177	0.000
	Staff HMO*					
	Denials (clinic)	-0.054	0.005	-10.009	1177	0.000
Health Plan	HP market area					
	Colorado	-0.450	0.079	-5.672	3	0.001
	Pennsylvania	-0.361	0.085	-4.238	3	0.041
	Florida*					
	HP model					
	IPA model plan	-0.509	0.123	-4.147	3	0.046
	Network/mixed plan	-0.586	0.122	-4.792	3	0.015
	Group/staff plan*					

*Comparison group

Table 5-5. Linear Regression Analysis Predicting Physician Attitudes Toward Financial Incentives (N=1368)*

Variable Type	Fixed Effect	Coefficient	SE	T-ratio	P-value
Physician	Age	-.002	.002	-1.102	.271
	Gender (female)	-.045	.041	-1.087	.277
Clinic	Clinic size	.000	.000	.176	.860
	Specialty (clinic)	.080	.034	2.377	.018
	Practice type (clinic)				
	Solo practice	-.216	.078	-2.786	.005
	Single spec group	-.197	.069	-2.859	.004
	Multi-spec group	-.177	.070	-2.520	.012
	Staff HMO**				
	Denials (clinic)	-.061	.005	-12.966	.000
Health Plan	HP size	.000	.000	.359	.720
	HP market area				
	Colorado	-.145	.045	-3.233	.001
	Pennsylvania	.056	.064	.873	.383
	Florida**				
	HP model				
	IPA model plan	-.457	.077	-5.938	.000
	Network/mixed plan	-.179	.086	-2.085	.037
	Group/staff plan**				

* Total R-square = 0.244, SE = 0.577

** Comparison group

Table 5-6. Linear Regression Analysis Predicting Physicians Attitudes Toward Rules/Regulations (N=1368)*

Variable Type	Fixed Effect	Coefficient	SE	T-ratio	P-value
Physician	Age	-.002	.002	-1.032	.302
	Gender (female)	-.036	.050	-.724	.469
Clinic	Clinic size	.000	.001	-.425	.671
	Specialty (clinic)	.117	.041	2.882	.004
	Practice type (clinic)				
	Solo practice	-.534	.093	-5.720	.000
	Single spec group	-.183	.083	-2.213	.027
	Multi-spec group	-.140	.084	-1.655	.098
	Staff HMO**				
	Denials (clinic)	-.068	.006	-12.136	.000
Health Plan	HP size	.000	.000	2.479	.013
	HP market area				
	Colorado	-.477	.054	-8.829	.000
	Pennsylvania	-.559	.077	-7.262	.000
	Florida**				
	HP model				
	IPA model plan	-.308	.093	-3.328	.001
	Network/mixed plan	-.404	.103	-3.908	.000
	Group/staff plan**				

* Total R-square = 0.250, SE = 0.694

** Comparison group

Table 5-7. Linear Regression Analysis Predicting Physicians Attitudes Toward Education/Selection (N=1368)*

Variable Type	Fixed Effect	Coefficient	SE	T-ratio	P-value
Physician	Age	.004	.002	1.861	.063
	Gender (female)	.047	.048	.977	.329
Clinic	Clinic size	.000	.000	.231	.817
	Specialty (clinic)	.236	.039	6.034	.000
	Practice type (clinic)				
	Solo practice	-.338	.090	-3.765	.000
	Single spec group	-.331	.080	-4.163	.000
	Multi-spec group	-.287	.081	-3.541	.000
	Staff HMO**				
	Denials (clinic)	-.055	.005	-10.213	.000
Health Plan	HP size	.000	.000	.672	.502
	HP market area				
	Colorado	-.481	.052	-9.257	.000
	Pennsylvania	-.395	.074	-5.335	.000
	Florida**				
	HP model				
	IPA model plan	-.543	.089	-6.094	.000
	Network/mixed plan	-.658	.100	-6.607	.000
	Group/staff plan**				

* Total R-square = 0.285, SE = 0.668

** Comparison group

Chapter 6. Discussion

The discussion starts with a summary of study conclusions for the SEM and HLM analyses. Conclusions from analyses are followed by implications for the conceptual model. Then limitations of the data and analyses are described. The final section provides ideas for future research related to physician attitudes toward managed care tools.

6.1 Conclusions

The purpose of this thesis is to address two questions regarding physicians' attitudes toward managed care tools: Do physicians practicing in the same clinics have similar views of managed care tools? And, do physicians' views of managed care tools differ across practice settings and organizational structures (e.g., types of clinics and health plans)? Using the literature on physician job attitudes and sociological and economic theory to guide the investigation, these questions were addressed by testing components of a theoretical framework for managed care tools and looking at predictors of physicians' attitudes toward managed care tools at three organizational levels: physicians, clinics and health plans.

6.1.1 SEM Conclusions

The goal of SEM in this study is to test an organizational control based typology of physician-directed managed care tools. The typology used here is based on Snell and Youndt's (1995) description of three types of organizational control (Table 2-2). The

three categories are: (1) financial incentives, (2) rules/regulations and (3) education/selection. SEM is considered a useful step in the process of theory testing and development (Anderson and Gerbing 1988). However, Smith, Brown, et al. (2001), are the only investigators to publish results of conducting this step in testing a typology of managed care tools.

Smith, Brown, et al. (2001) also explored a model with three latent variables ('facilitators', 'barriers' and 'clinical capabilities') on a previous round of data collected by the PEHP project. This typology of managed care tools is predicated on the idea that tools can either be helpful (facilitate) or get in the way of (barrier) providing care to patients. In this model attitude items are categorized based on whether the item is worded in a positive or negative way. For example, the item "I feel pressure from (insert plan name) to encourage my sicker patients to disenroll from the plan" is part of the barrier scale and the item "Patients who really need to see a specialist are able to see one promptly" is part of the facilitator scale, while both items are classified as financial incentives in the organizational control typology tested here. "Clinical capabilities" is the third latent variable in the Smith, Brown, et al (2001) model and it represents the influence of MCO structure on quality of care. In the conceptual model used in this study, MCO structure serves as a predictor of physician attitudes toward managed care tools. The concept of facilitators and barriers is characteristic of the professional view of physicians because it coincides with the idea that a physician's surrounding context can be described as either "pro" or "anti" professionalism (Table 2-1).

The Smith, Brown, et al. (2001) model was tested on generalist physicians only (N = 419) in a single market area. Reported goodness of fit indicators for their SEM include, GFI = 0.90, AGFI = 0.87, NFI = 0.88, and CFI = 0.92. The same goodness of fit indicators for the generalist model in this study are GFI = 0.98, AGFI = 0.96, NFI = 0.98 and CFI = 0.98. The specialist model goodness of fit indices are GFI = 0.97, AGFI = 0.94, NFI = 0.98, CFI = 0.99. The range of these four types of fit indices is zero to one. Values $\geq$ 0.90 are considered acceptable, but values $\geq$ 0.95 are considered indicators of good fit. Therefore, SEM results indicate that the generalist and specialist models in this study fit the data better than the model tested on generalists by Smith, Brown, et al. (2001). These results suggest that the organizational control typology tested in this study is better than one based on the idea of facilitators, barriers and clinical capabilities.

An important issue identified by the SEM analysis is the high latent variable correlations within the models (0.74-0.90 for generalists and 0.81-0.86 for specialists; see Figures 5-1 and 5-2). While some overlap was predicted, these correlations are much higher than the Pearson correlations among the scales (0.53 – 0.62 for full sample; $p<0.001$). These high latent variable correlations in the SEM analysis suggest two possible conclusions. First, item wording may play a role in producing these correlations. SEM and Pearson correlations are calculated differently. SEM analysis fixes variable cross-correlations (between scale item correlations) at zero while no such assumptions are made for Pearson correlations. A small portion of the restrictions was lifted in the process of fitting the

model in this study, but a large number of them remain. The higher correlations observed in the SEM analysis suggest that variable cross-correlations are to blame. Testing this same model on survey items that do not include the facilitator/barrier phrasing used in the PEHP survey may result in lower latent variable correlations. Second, the substantial overlap among scales may also be a characteristic of how managed care tools were implemented at the time that the PEHP data were collected. Implementation of managed care tools by health plans and clinics is constantly evolving. This reality suggests that the 3-factor organizational control typology tested here should be retained for future investigation. Overlap in managed care tool implementation may have changed enough since 1998-99 that the latent variable correlations observed here have also changed.

Overall, results of the SEM suggest that managed care tools can be described and classified in terms of the types of control they exert on physicians. However, future investigations of this typology should explore the possibility that scales be combined into a 2-factor model (with financial incentives and rules/regulations in one factor and education/selection in the other factor) instead of the 3-factor model described and tested here. The results of this study also confirm that future investigation should look at generalists and specialists separately.

6.1.2 HLM Conclusions

This study is the first to apply multi-level modeling to physician attitudes where physicians are nested within clinics and clinics are nested within health plans. The first

part of this analysis looks at the partitioning of variance across these three levels. Physician-level variation is a measure of within-clinic differences (differences between physicians within clinics). Clinic-level variation is a measure of the differences between clinics within health plans and health plan-level variation is a measure of between-health plan differences. These proportions quantify the total amount of variation that can be explained by independent variables at each level. Therefore, no matter how large the regression coefficient is for any variable in the model, the ability of that variable to explain overall variation is limited by the proportion of variance at that level. The results of the HLM analyses with no independent variables (proportion of variance models) indicate that the majority of the variation of physician attitudes toward managed care tools is at the physician level. The next largest portion of variance is at the health plan level and clinic level is the smallest. The small amount of variation at the clinic level was not expected based on the SIP perspective and the conceptual model. However, this result could be due to the small drop in the number of cases between the physician and clinic levels. The number of physicians in the dataset is N = 1,368 and the number of clinics is N = 1,184. This means that only 24% of the respondents were identified as practicing in the same clinic as another respondent in the dataset. If clinic association was taken into account in the process of sampling, more of the respondents would be nested within clinics and the proportion of variance explained at the clinic level may increase.

There are also differences in proportion of variance explained at each level among the three types of managed care tools. The results indicate that physicians practicing in the same clinics and health plans share more views on education/selection tools than other types of managed care tools (17.4% for education/selection vs. 2.4% for financial incentives and 8.2% for rules/regulations at the clinic level; 17.9% for education/selection vs. 11.5% for financial incentives and 14.0% for rules/regulations at the health plan level; Table 5-1). Extending this conclusion to the conceptual model, these findings suggest that the degree to which attitudes toward managed care tools are affected by social information and the formal organization is greater for education/selection tools.

The second part of the HLM analysis examined size and statistical significance of the physician, clinic and health plan level predictors across the three types of managed care tools. Physician age, gender and clinic size were not statistically significant predictors for any of the three managed care tool scales (Tables 5-2, 5-3 and 5-4). This result was not surprising for the physician-level predictors (age and gender), based on the contradictory findings in the literature. Three studies found no age or gender differences (Borowsky, Davis, et al. 1997; Chehab, Panicker, et al. 2001; Reschovsky, Reed, et al. 2001). One study found a small but significant age difference (Halm, Causino, et al. 1997) and another study found a small but significant gender difference (Felman, Novak, et al. 1998). The hypothesis of a clinic size effect on physician attitudes was based on the idea that larger clinics could buffer physicians from the effects of health plan efforts to

control physician practice. The findings related to clinic size in this study do not support the idea that larger clinics provide a buffer for physicians. However, this may not be the best way to test for the buffering effect of clinics. A better option would be to include clinic size as an interaction term in the HLM analysis. However, this could not be done with the data analyzed here.

Proportion of generalists, practice type and average number of denials in the past 6 months (clinic-level) are all statistically significant predictors of physician attitudes toward managed care tools (Tables 5-2, 5-3 and 5-4). All three of these variables are clinic-level predictors. Therefore, their ability to explain overall variation in the dependent variables is limited because the proportion of variance explained results indicate a small amount of variation at the clinic level (between 2.4% and 17.4% of total variation in physician attitudes across the three managed care tool scales; Table 5-1). With this caveat in mind, the results support findings in the literature regarding generalists being more positive about all three types of managed care tools than specialists (Borowsky, Davis, et al. 1997; Chehab, Panicker, et al. 2001; Reschovsky, Reed, et al. 2001).

With regard to practice type, the distinctions between different types of non-staff HMO practices (solo practice, single-specialty group and multi-specialty group) are only supported by results of the rules/regulations scale (Tables 5-2, 5-3 and 5-4). The coefficients on the three practice types are similar in the financial incentives and

education/selection scales. This suggests that the distinction between staff HMO and non-staff HMO practices (commonly used in the literature) is adequate for these two scales but not for the rules/regulations scale. In all cases, physicians in staff HMO practices reported more positive attitudes toward managed care tools than physicians in other practice types.

Market area has not been included in previous analyses. This study shows a clear difference between Colorado and Florida for rules/regulations and education/selection (Tables 5-3 and 5-4, respectively) and between Pennsylvania and Florida for education/selection. It would be interesting to compare these results to differences in the average number of managed care contracts in the three market areas. Previous studies have shown that physicians with more managed care contracts have more negative attitudes toward all types of managed care tools (Reschovsky, Reed, et al. 2001). Therefore, market area differences observed in the present analysis could be related to differences in the number of managed care contracts physicians have in different market areas.

The significance of health plan model type in predicting physician attitudes varies across the three types of managed care tools. Attitudes toward education/selection tools in IPA and Network/mixed plans are more negative than in Group/staff plans (Table 5-4). Only IPA is statistically significant for the financial incentives scale and neither of the 2 health plan model types are statistically significant predictors of the rules/regulations scale

(Table 5-3). The findings for education/selection are consistent with differences between health plan models identified in the literature (Borowsky, Davis et al. 1997; Chehab, Panicker, et al. 2001; Williams, Zaslavsky, et al. 1999). In the present study, results for education/selection tools indicate that physicians in IPA and network/mixed plans have more negative attitudes than staff model HMO physicians (Table 5-4).

Looking back on the proportion of variance results it is important to note that the health plan level explains between 11% and 18% of the total variation in physician attitudes (Table 5-1). Therefore, the models analyzed in this study leave a large amount of differences among physicians unexplained.

The final step in the analysis was to compare HLM and linear regression results across the three types of managed care tools. The size of the regression coefficients for HLM and linear regression models were similar for all the physician and clinic-level variables included in the analyses. However, 2 more health plan level predictors were statistically significant for the financial incentives linear regression and 3 more health plan level predictors were statistically significant for the rules/regulations linear regression. The literature describing advantages to HLM analysis over linear regression for nested data claims that HLM estimates less biased coefficients than linear regression. The differences observed in the present analyses indicate that health plan market area and health plan model type are less important predictors of attitudes toward financial incentives and rules/regulations than linear regression analyses indicate.

In summary, results of the HLM analysis suggest that physicians practicing in the same clinic and health plans share some similar attitudes toward managed care tools, but the majority of differences are still at the physician level. Physician characteristics included in this study do not explain these differences, leaving open the question of whether the majority of variation is due to real differences in how individual physicians experience managed care tools, or is it due to measurement error (i.e., "under identification" of clinic association)? Future analysis could clarify this issue if clinic associations can be identified more accurately and/or better physician level predictors are developed. Additional physician level variables suggested by the conceptual model include two types of items, (1) items that focus on specific physician "needs" (e.g, work-life balance, autonomy, reimbursement), and (2) items that measure physician exposure to specific managed care tools.

6.1.3 Implications for the Conceptual Model

Based on the SIP perspective, the conceptual model predicts that a substantial amount of variation will be observed at the clinic level. However, the proportion of variance explained results do not entirely support this hypothesis. Clinic-level variation is the smallest of the three levels (2.4% for financial incentives, 8.2% for rules/regulations, and 17.4% for education/selection; Table 5-1). Therefore, a relatively small amount of variation was observed at the clinic level. This finding may be the consequence of a lack of statistical power in the analysis (only 24% of respondents practicing in the same clinic

as another respondent in the dataset). Or, it could be an indicator of a relatively small role played by clinics in affecting physician attitudes about managed care tools.

The conceptual model also predicts that physicians practicing in the same health plans will share similar views because of the health plan's influence on implementation of managed care tools and shared social information. Results of the analysis indicate that health plan variation is somewhat larger than clinic variation (11.5% for financial incentives, 14.0% for rules/regulations, and 17.9% for education/selection; Table 5-1) but still substantially smaller than the variation at the physician level.

The conceptual model states that physician characteristics, clinic characteristics, and health plan characteristics will all be predictive of physician attitudes toward managed care tools. Results of the analysis support the role of clinic and health plan characteristics but not physician characteristics in predicting attitudes. Only two physician characteristics were tested in the analysis, age and gender. Based on the large amount of variation at the physician level, future research should investigate other possible physician characteristics that may predict attitudes (e.g, measure individual physician "needs" and exposure to managed care tools).

To summarize, physician behavior determines the success of managed care tools because providers choose whether or not to follow their guidance. This study focuses on attitudes because they can be useful in predicting behavior. The attitudes examined in this study

fit several of the criteria cited in the literature for being more predictive of behavior. Background literature supports the conceptual model assertion that physician attitudes help predict adherence to managed care tools. A better understanding of physicians' attitudes about how managed care tools affect quality of care will improve the development of more effective managed care tools by focusing clinics and health plans on the roles they play in managed care tool implementation and allowing them to tailor the tools to their physicians.

6.2 Limitations

Several limitations of the PEHP data should be considered when interpreting the results of this study. First, the market areas and health plans chosen by the PEHP study were not intended to be a representative sample of the entire United States. Market areas were selected primarily for their high managed care penetration, with geographic diversity as a secondary criteria. Second, MCOs were selected because they had the largest market shares and because they were identified by the purchasing partner within each site. Managed care penetration has increased since these data were collected so the findings have become even more relevant then when the data were collected.

Because the data were not collected with these analyses in mind, there are some inherent limitations to this study related to item wording and survey administration. First, attitudinal items were not written to represent attitudes toward individual tools. This results in difficulty classifying several items in the survey, lower factor loadings on some

items, and some items loading on more than one type of managed care tool. Second, because address and clinic data were so poor across all sites in the study, assignment of the clinic variable was conducted using phone number data. Incomplete phone number data mean that sample size was lost within sites that were included in this study, as well as causing two sites to be dropped (i.e., Washington and New York). Also, using phone number data to nest physicians within clinics is likely to miss some physician-clinic associations where individual clinics have multiple phone numbers (i.e., "under identification" of clinic associations). It is possible that some associations were missed because phone number data were used instead of address data. This occurrence may be more likely in larger clinics. Address data were a possible alternative for identifying clinic associations. However, address data are even more problematic than phone number data because there is a large amount of missing or inconsistent street address and suite number information. Using address data to create physician-clinic associations would likely group some physicians together that do not practice in the same clinic. This "over identification" of clinics would be most likely where physicians practice in buildings with multiple clinics (e.g., medical office buildings). "Over identification" may lead to spurious effects in the HLM analysis. "Under identification" would lead to less variance and smaller effect sizes at the clinic level. In summary, creating clinic associations with health plan provider directories is an imperfect representation of which physicians practice in the same clinic. The decision to use phone number data may have contributed to the small amount of variance and smaller coefficients for independent variables at the clinic level.

In the process of interpreting the results of these analyses, it is also important to note that physician responses are likely to reflect the ever-changing environment of managed care in ways that were not predicted. A possible example of this situation was observed by the PEHP project team in the process of disseminating data to the health plans in the study. When average number of denials was reported to plan administrators, many of them explained that their health plan had stopped denying authorizations prior to the time window addressed by the survey. Perhaps physicians were reporting on experiences with denials prior to the six month time window. Another possibility is that these plans had shifted to other ways of denying payment that the physicians still classified as denials, such as delaying approvals. Applying this observation more broadly, respondents may have used their own definitions of managed care terminology in determining responses to survey items. The example cited here suggests that there was a disconnect between how the PEHP survey team and respondents viewed denials. In future surveys, providing respondents with definitions of managed care terms may help reduce confusion.

An additional limitation of the data is that physicians are not perfectly nested within health plans or clinics. In particular, highly specialized physicians are likely to contract with all health plans within a given market area. For the purposes of this study, physicians were asked to respond based solely on their experiences with patients from the plan for which they were sampled. However, it is possible that physicians' experiences

with other MCOs and clinic settings also influence their attitudes toward managed care tools to some extent.

6.3 Future Research

Specific issues arose in both the SEM and HLM analyses that have already been described. Future investigation should start with re-writing survey items to better differentiate between the three types of managed care tool scales and then examining the remaining overlap of scales to determine if changes need to be made to the typology. The next steps should include testing additional physician characteristics and attempting to improve clinic association data to see if these affect results of the proportion of variance explained analysis. Additional physician characteristics suggested by the conceptual model include exposure to managed care tools and a measure of physician "needs". The physician as worker, professional and supplier/agent perspectives suggest several possible "needs" (e.g, work-life balance, autonomy, reimbursement) to be addressed (see Table 3-1). Survey items would assess the importance of each "need" to individual physicians. Analysis would address at least two important questions related to physician attitudes toward managed care tools, (1) do physicians with the same "need" profiles select into the same practice settings, and (2) do "need" profiles predict physician attitudes?

There are at least two additional areas of exploration that could serve as the next steps in a better understanding of physician adherence to managed care tools. First, the

relationship between physician attitudes toward managed care tools and behavior should be further investigated. The conceptual model hypothesizes the relationship between attitudes and behavior, but it has not been tested. The literature suggests that attitudes measured in this study would be predictive of physician behavior. Establishing this link empirically would provide support for the future investigation of physician attitudes toward managed care tools. Second, physician attitudes could be used to identify the possibility of unintended consequences of physician-directed managed care tools. Recent literature has cited concerns about potential problems associated with pay for performance initiatives (Gravelle, Sutton, et al. 2010; SGIM 2009). These unintended consequences are the result of physicians finding ways to work around the requirements of this new hybrid managed care tool ("gaming the system"). Whether physicians are "gaming" for their own benefit or in an attempt to provide better care for their patients, we need a better understanding of why physicians behave this way and how it can be controlled. In the same way that physician attitudes toward managed care tools may be predictive of adherence, attitudes may also be predictive of physician "gaming". Negative attitudes toward specific managed care tools may be an indicator that the chance for this type of behavior is high.

In summary, this study found that clinic and health plan characteristics help predict physician attitudes toward managed care tools. It also found that there is a substantial amount of unexplained variance at the physician level. Further investigation of physician

attitudes could be useful in developing a better understanding of physician adherence to managed care tools and change the way these tools are implemented in the future.

Bibliography

Abbott, A. (1988). The System of Professions: An essay on the division of expert labor. Chicago, IL: University of Chicago Press.

ABIM. (1995). Project Professionalism. Philadelphia, Pa: American Board of Internal Medicine.

Ajzen I. and Fishbein M. (1977). "Attitude–Behavior Relations: A Theoretical Analysis and Review of Empirical Research." Psychological Bulletin **84**:888-918.

Ajzen I. and Madden T. J. (1986). "Prediction of Goal-Directed Behavior: Attitudes, Intentions and Perceived Behavioral Control." Journal of Experimental Social Psychology **22**: 453-74.

Anderson, J. C. and D. W. Gerbing (1988). "Structural equation modeling in practice: A review and recommended two-step approach." Psychological Bulletin **103**(3): 411-23.

Arbuckle, J. L. (2005). Amos 6.0 User's Guide, Chicago, IL: SPSS Inc.

Aseltine, R. H., B. E. Landon, et al. (2000). "The physician's perspective on managed care organizations in Massachusetts: A three-year follow-up." Available at www2.mms.org/pages/mcreport.asp.

Baker, L. C., J. C. Cantor (1993). "Physician satisfaction under managed care." Health Affairs (Millwood) **12**(suppl): 258-70.

Bell, R. A., R. L. Kravitz, et al. (1997). "Physicians' attitudes toward managed care: Assessment and potential effects on practice behaviors." American Journal of Managed Care **3**(9): 1297-1304.

Benko, L. B. (2003). "Going back in time: Citing cost efficiency, plans offer narrow networks." Modern Healthcare Nov. 24, 2003: 14-15.

Borowsky, S. J., M. K. Davis, et al. (1997). "Are all health plans created equal? The physician's view." JAMA **278**(11): 917-21.

Borowsky, S. J., C. Goertz et al. (1996). "Can physicians diagnose strengths and weaknesses in heatlh plans?" Annals of Internal Medicine **125**(3): 239-41.

Brach, C., L. Sanches, et al. (2000). "Wrestling with typology: Penetrating the "black box" of managed care by focusing on health care system characteristics." Medical Care Research and Review **57**(suppl 2): 93-115.

Brown, T. A. (2006). Confirmatory Factor Analysis for Applied Research. New York: Guilford Press.

Bryk, A. S., S. W. Raudenbush (1992). Hierarchical Linear Models: Applications and data analysis methods. Newbury Park, CA: Sage Publications.

Cabana, M. D., C. S. Rand, et al. (1999). "Why don't physicians follow clinical practice guidelines? A framework for improvement." JAMA **282**(15): 1458-65.

Campbell, S. M., M. O. Roland, et al. (2000). "Defining quality of care." Social Science and Medicine **51**(11): 1611-25.

Casalino, L. P., G. C. Alexander, et al. (2007). "General internists' views on pay-for-performance and public reporting of quality scores: a national survey." Health Affairs (Millwood) **26**(2): 492-99.

Cassidy, W. M., T. Dyson, et al. (2001). "Assessments of managed care organizations in the greater Baton Rouge area by physicians and physicians' office managers." Journal of Louisiana State Medical Society **153**(3):135-41.

Chehab, E. L., N. Panicker, et al. (2001). "The impact of practice setting on physician perceptions of the quality of practice and patient care in the managed care era." Archives of Internal Medicine **161**(2): 202-11.

Cheng, J. L. C. and W. McKinley (1983). "Toward an integration of organization research and practice: A contingency study of bureaucratic control and performance in scientific settings." Administrative Science Quarterly **28**(1): 85-100.

Christianson, J. B, D. J. Knutson, et al. (2006). "Physician pay-for-performance: Implementation and research issues." Journal of General Internal Medicine **21**: S9-13.

Christianson, J. B., L. H. Warrick, et al. (2005). "Physicians' perceptions of managed care: A review of the literature." Medical Care Research and Review **62**(6): 635-75.

Christianson, J. B., D. R. Wholey, et al. (2003). "How are health plans supporting physician practice? The physician perspective." Health Affairs (Millwood) **22**(1): 181-89.

Cykert, S., C. Hansen, et al. (1997). "Primary care physicians and capitated reimbursement: Experience, attitudes and predictors." Journal of General Internal Medicine **12**(3): 192-4.

Davidson A. R. and Jaccard J. J. (1979). "Variables that moderate the attitude–behavior relation: Results of a longitudinal survey." Journal of Personality and Social Psychology **37**:1364–76.

Davis, D. A., M. A. Thomson, et al. (1995). "Changing physician performance: a systematic review of the effect of continuing medical education strategies." JAMA **274**(9): 700-5.

Donabedian, A. (1980). Explorations in quality assessment and monitoring. Volume 1: The definition of quality and approaches to its assessment. Ann Arbor, MI: Health Administration Press.

Draper, D. A., R. E. Hurley, et al. (2002). "The changing face of managed care." Health Affairs (Millwood) **21**(1): 11-23.

Eagly, A. and S. Chaiken (1993). The Psychology of Attitudes. New York: Harcourt Brace.

Eisenhardt, K. M. (1985). "Control: Organizational and economic approaches." Management Science **31**(2): 134-49.

Eisenhardt, K. M. (1989). "Agency theory: An assessment and review." Academy of Management Review **14**(1): 57-74.

Elovainio, M., M. Makela, et al. (2000). "Effects of job characteristics, team climate, and attitudes towards clinical guidelines." Scandinavian Journal of Public Health **28**: 117-22.

Fazio, R. H. and M. Olson. (2003). "Attitudes: Foundations, Functions, and Consequences." The SAGE Handbook of Social Psychology. Retrieved April 26, 2010, from http://www.sage-ereference.com.floyd.lib.umn.edu/hdbk_socpsych/Article_n6.html

Feldman, D. S., D. H. Novack, et al. (1998). "Effects of managed care on physician-patient relationships, quality of care, and the ethical practice of medicine: a physician survey." Archives of Internal Medicine **158**(15): 1626-32.

Fernandez, A., K. Grumbach, et al. (2001). "Primary care physicians' experience with disease management programs." Journal of General Internal Medicine **16**(3): 163-7.

Fishbein, M., I. Ajzen (1974). "Attitudes towards objects as predictors of single and multiple behavioral criteria." Psychological Review **81**: 59-74.

-------- (1975). Belief, Attitude, Intention and Behavior: An introduction to theory and research. Reading, MA: Addison-Wesley.

Flynn K. E., M. A. Smith, et al. (2002). “From physician to consumer: The effectiveness of strategies to control health care utilization.” Medical Care Research and Review **59**(4):455-81.

Gabel, J., L. Levitt, et al. (2002). “Job-based health benefits in 2002: Some important trends.” Health Affairs (Millwood) **21**(5): 143-51.

Ginsburg, P. B. (2005). "Competition in health care: Its evolution over the past decade." Health Affairs **24**(6): 1512-22.

Gleid, S. (1999). “Managed care.” July 1999, NBER Working Paper W7205, www.nber.org/papers/w7205 (17 April 2010).

Glisson, C., M. Durick, et al. (1988). "Predictors of job satisfaction and organizational commitment in human service organizations." Administrative Science Quarterly **33**(1): 61-81.

Goddard, M., R. Mannion, et al. (2000). “Enhancing performance in health care: A theoretical perspective on agency and the role of information.” Health Economics **9**: 95-107.

Goode, W. J. (1957). "Community within a community: The professions." American Sociological Review **22**: 194-200.

Gravelle, H., M. Sutton, et al. (2010). "Doctor behaviour under a pay for performance contract: Treating, cheating and case finding?" The Economic Journal **120**(542): F129-56.

Grembowski, D. E., P. Diehr, et al. (2000). “Measuring the "managedness" and covered benefits of health plans.” Health Services Research **35**(3): 707-34.

Hafferty, F. W. (2006). "Definitions of professionalism: A search for meaning and identity." Clinical Orthopaedics and Related Research **449**: 193-204.

Halm, E. A., N. Causino, et al. (1997). “Is gatekeeping better than traditional care?” JAMA **278**(20): 1677-81.

Hargraves, J. L., R. H. Palmer, et al. (1996). “Are differences in practitioners' acceptance of a quality assurance intervention related to their performance?” Medical Care **34**(9): 77-86.

Hillman, A. L. (1991). “Managing the physician: rules versus incentives.” Health Affairs (Millwood) **10**(4): 138-46.

Hoff, T. J. (2001). “The physician as worker: What it means and why now?” Health Care Management Review **26**(4): 53-70.

Hovland, C., I. Janis, et al. (1953). Communication and Persuasion. New Haven: Yale University Press.

Hu L-T. and P. M. Bentler (1999). “Cut-off criteria for fit indices in covariance structure analysis: conventional criteria versus new alternatives.” Structural Equation Modeling **6**:1-55.

Institute of Medicine (2001). Crossing the Quality Chasm: A new health system for the 21st Century. Washington, DC: National Academy Press.

Interstudy (1997). Interstudy HMO Competitive Edge. St. Paul, MN: Interstudy

Jensen, M. (1983). "Organization theory and methodology." Accounting Review **56**: 319-38.

Jöreskog, K. G. and Sörbom, D. G. (2007). LISREL 8.80 for Windows [Computer software]. Chicago, IL: Scientific Software International.

Juran, J. M. (1988). Juran on Planning for Quality. New York: Free Press.

Kanungo, R. N. and R. W. Wright (1983). "A cross-cultural comparative study of managerial job attitudes." Journal of Business Studies **14**(2): 115-29.

Kelly C. and S. Breinlinger (1995). "Attitudes, intentions, and behavior: A study of women's participation in collective action". Journal of Applied Social Psychology **25**:1430–45

Kerr, J. L. (1985). "Diversification strategies and managerial rewards: An empirical study." Academy of Management Journal **28**: 155-79.

Kerr, E. A., B. S. Mittman, et al. (1995). “Managed care and capitation in California: How do physicians at financial risk control their utilization.” Annals of Internal Medicine **123**: 500-4.

Kerr, E. A., B. S. Mittman, et al. (1996). “Quality assurance in capitated physician groups. Where is the emphasis?” JAMA **276**: 1236-9.

Kline R. B. (2005). Principles and Practice of Structural Equation Modeling. 2nd ed New York: The Guilford Press.

Kraus S. J. (1995). "Attitudes and the prediction of behavior: A meta-analysis of the empirical literature." Personality and Social Psychology Bulletin **21**:58-75.

Laitinen, P. (1992). "Participation of informal caregivers in the hospital care of elderly patients and their evaluations of the care given: Pilot study of three different hospitals." Journal of Advanced Nursing 17(10): 1233-37.

Landon, B. E., I. B. Wilson, et al. (1998). "A conceptual model of the effects of health care organizations on the quality of medical care." JAMA **279**(17): 1377-82.

Linzer, M., T. R. Konrad, et al. (2000). "Managed care, time pressure, and physician job satisfaction: Results from the physician worklife study." Journal of General Internal Medicine **15**(7): 441-50.

Lohr, K. (1992). Medicare: A strategy for quality assurance. Washington, DC: National Academy Press.

Mason, C. H. and W. D. Perreault (1991). "Collinearity, power and interpretation of multiple regression analysis." Journal of Marketing Research **28**: 268-80.

Maxwell, R. J. (1984). "Quality assessment in health." British Medical Journal (Clinical Research Edition) **288**(6428): 1470-2.

McGuire, T. G. (2000). "Physician agency." In Handbook of Health Economics Vol. 1, eds. A. J. Culyer and J. P. Newhouse. New York: Elsevier.

Murphy, K. M. and D. B. Nash (2008). "Non-primary care physicians' views on office-based quality incentive and improvement programs." American Journal of Medical Quality **23**(6): 427-39.

Ouchi, W. G. (1977). "The relationship between organizational structure and organizational control." Administrative Science Quarterly **20**:95-113.

-------- (1978). "The transmission of control through organizational hierarchy." Administrative Science Quarterly **21**: 173-92.

-------- (1980). "Markets, bureaucracies, and clans." Administrative Science Quarterly **25**(1): 129-41.

Pontes, M. C. (1995). "Agency theory: A framework for analyzing physician services." Health Care Management Review **20**(4): 57-67.

Raudenbush, S W., A. S. Bryk, et al. (2004). HLM 6: Hierarchical Linear and Nonlinear Modeling. Lincolnwood, IL: Scientific Software International Inc.

Raudenbush, S. W., A. S. Bryk, et al. (2009). HLM 6 for Windows [Computer software]. Lincolnwood, IL: Scientific Software International.

Reschovsky, J., M. Reed, et al. (2001). “Physicians' assessments of their ability to provide high-quality care in a changing health care system.” Medical Care **39**(3): 254-69.

Robinson, J. C. (1999). The Corporate Practice of Medicine: Competition and Innovation in Health Care. Berkeley, CA: Univeristy of California Press.

Salancik. G. R. and J. Pfeffer (1977). "An examination of need satisfaction models of job attitudes." Administrative Science Quarterly **22**: 427-56.

-------- (1978). “A social information processing approach to job attitudes and task design.” Administrative Science Quarterly **23**(2): 224-53.

Schectman, J. M., N. K. Kanwal, et al. (1995). “The effect of an education and feedback intervention on group-model and network-model health maintenance organization physician prescribing behavior.” Medical Care **33**(2): 139-44.

Schulz, R. and C. Schulz (1988). “Management practices, physician autonomy, and satisfaction. Evidence from mental health institutions in the Federal Republic of Germany.” Medical Care **26**(8): 750-63.

Schuman, H. (1995). “Attitudes, beliefs, and behavior.” In K.S. Cook, G.A. Fine, and J.S. House, eds., Sociological Perspectives on Social Psychology. Boston: Allyn and Bacon.

Segen, J. C. (2002). Concise Dictionary of Modern Medicine. New York: McGraw-Hill

SGIM (2009). "High quality care and ethical pay-for-performance: A Society of General Internal Medicine policy analysis." Journal of General Internal Medicine **24**(7): 854-9.

Sharma, A. (1997). “Professional as agent: Knowledge asymmetry in agency exchange.” Academy of Management Review **22**(3): 758-98.

Smith, M.A., A.B. Bindman et al. (2001). “To help or hinder - which is more important in explaining a physician's willingness to recommend a health plan?” Medical Care **39**(5):469-477.

Smith, M. A., M. E. Brown, et al. (2001). "Measuring the physician perspective on quality of care in health plans." Evaluation and the Health Professions **24**(1): 18-35.

Snell, S. A. (1992). "Control theory in strategic human resource management: The mediating effect of administrative information." Academy of Management Journal **35**: 292-327.

Snell, S. A. and M. A. Youndt (1995). “Human resource management and firm performance: Testing a contingency model of executive controls.” Journal of Management **21**(4): 711-37.

SPSS (1997). Missing Values Analysis 7.5 [Computer software]. Chicago, IL: SPSS Inc.

SPSS (2009). PASW Statistics 18.0 for Windows [Computer software]. Chicago, IL: SPSS Inc.

Steiger, J. H. and J. Lind (1980). “Statistically-based tests for the number of common factors.” Paper presented at the Annual Spring Meeting of the Psychometric Society, Iowa City.

Stoddard, J. J., J. D. Reschovsky, et al. (2001). "Managed care in the doctor's office: Has the revolution stalled?" American Journal of Managed Care **7**(11): 1061-67.

Strunk. B.C., P. B. Ginsburg, et al. (2002). “Tracking health care costs: Growth accelerates again in 2001.” 25 September 2002, www.healthaffairs.org/WebExclusives/Strunk_Web_Excl_092502.htm (17 January 2003).

Sullivan, L. M., K. A. Dukes, et al. (1999). "An introduction to hierarchical linear modelling." Statistics in Medicine **18**(7): 855-88.

Tett, R. P. and J. P. Meyer (1993). "Job satisfaction, organizational commitment, turnover intention, and turnover: Path analyses based on meta-analytic findings." Personnel Psychology **46**(2): 259-93.

Thompson, J. D. (1967). Organizations in action. New York: McGraw-Hill.

Thurstone, L. L. (1967). “The measurement of social attitudes.” In Readings in Attitudes Theory and Measurement, ed. M. Fishbein. New York: Wiley.

Weigel R. H. and Newman L. S. (1976). "Increasing attitude–behavior correspondence by broadening the scope of the behavioral measures." Journal of Personality and Social Psychology **33**:793–802.

Wholey, D. R., J. B. Christianson, et al. (2003a). "Evaluating health plan quality 1: A conceptual model.” American Journal of Managed Care **9**(suppl): SP53-64.

-------- (2003b). "Evaluating health plan quality 2: Survey design principles for measuring health plan quality." American Journal of Managed Care **9**(suppl): SP65-75.

-------- (2003c). "Evaluating health plan quality 3: Survey measurement properties." American Journal of Managed Care. **9**(suppl): SP76-87.

-------- (2003d). "What do physician recommendations of health plans mean?" American Journal of Managed Care. **9**(suppl): SP88-110.

Williams, E. S. (2001). "Physician as worker: An organizational behavior perspective." Health Care Management Review **26**(4): 78-81.

Williams, E. S. and A. C. Skinner (2003). "Outcomes of physician job satisfaction: A narrative review, implications and directions for future research." Health Care Management Review **28**(2):119-39.

Williams, T. V., A. M. Zaslavsky, et al. (1999). "Physician experiences with, and ratings of, managed care organizations in Massachusetts." Medical Care **37**(6): 589-600.

Woolf, S. H. (1993). "Practice guidelines: A new reality in medicine, III: Impact on patient care." Archives of Internal Medicine **153**: 2646-55.

Wright, P., A. Mukherji, et al. (2001). "A reexamination of agency theory assumptions: extensions and extrapolations." Journal Socio-Economics **30**: 413-29.

Young, G. J., M. Meterko, et al. (2007). "Physician attitudes toward pay for quality programs: Perspectives from the front line." Medical Care Research and Review **64**: 331-43.

Appendix A. Key Literature on Physician Attitudes Toward Managed Care Tools

Article	Sample	Type of Analysis	Dependent Variables	Independent Variables	Findings (of interest to me)
Borowsky, Davis, et al. 1997	Phone survey conducted in 1995 In Minneapolis-St. Paul, MN; sample taken from published provider lists of 3 health plans; 84%	X^2 tests, Student *t* test, Cronbach Alpha, ANOVA	Items - time w/patients, authorization policies, access to specialists, cost first, preventive services, new tests and procedures (Strongly Agree to Strongly Disagree or Excellent to Poor)	Plan	Staff model HMO rated significantly higher than plans 1 & 3 for all items, except one (only higher than plan 3 for time w/patients item)
	response rate (N=249)		Scales - utilization management, quality of spec care, access to spec care, mental health care, promoters, time(?), overall access (?) and quality of primary care(?)	Age & gender	Cronbach Alpha for scales not reported; no age or gender differences found
			Same as above	Specialty & specialty x plan interaction	Generalists had higher ratings for quality of primary care; for specilaty access there were no specialty differences for plan 2 (staff model HMO), but in plans 1 & 3 specialists gave lower ratings

Article	Sample	Type of Analysis	Dependent Variables	Independent Variables	Findings (of interest to me)
			Same as above	Plan	Staff model HMO rated higher than plans 1 & 3 for all scales (except time, overall access and quality of primary care?); plan 1 rated higher than 3 for quality of specialty care
Chehab, Panicker, et al. 2001	Mail survey conducted in 1998 in San Mateo County, CA; sample taken from members of county medical assoc.;	Bivariate	1) How do treatment guidelines affect the quality of care you offer to patients? (Decrease - No effect - Increase)	Practice setting: staff group model HMO (SGM-HMO) vs. office-based independent practice (OBIP - includes solo, single spec and multi spec)	SGM-HMO more positive than OBIP - no significance test reported
	113 SGM-HMO and 250 OBIP responded; 35% response rate (N=381)	Bivariate	2) How do drug formularies affect the quality of care you offer to patients? (Decrease - No effect - Increase)	Practice setting	SGM-HMO more positive than OBIP - no significance test reported
		Visual comparison of bar graph	Guidelines and formularies questions - described above	Practice setting	More positive on guidelines than formularies - no sig. test reported; difference between guidelines and formularies bigger for OBIP - no sig. test reported

Article	Sample	Type of Analysis	Dependent Variables	Independent Variables	Findings (of interest to me)
		Bivariate	3) Combined score for guidelines and formularies	Practice setting	SGM-HMO more positive than OBIP (P<0.001); means on 5 point likert-type scale: 3.5(0.8) for SGM-HMO and 2.5(0.6) for OBIP
		Multivariate analysis of variance (MANOVA)	4) 16 item summary score of 'quality of patient care' items - including guidelines and formularies questions	Practice setting, income changes (up, same, down), practice specialty (prim vs. spec) years in practice (<10, >10), gender	SGM-HMO substantially more positive (3.3 vs. 2.3; P<0.001);No sig. difference for years in practice and gender after controlling for all other vars.; PCPs slightly more postitive (P=0.01); income change 'down' more negative than 'up' or 'same' (P=0.002)
Cykert, Hansen, et al. 1997	Mail survey conducted in 1994; nationally rep.	Descriptive statistics	All items?	Responders vs. non-responders & early vs. late responders	No significant differences

Article	Sample	Type of Analysis	Dependent Variables	Independent Variables	Findings (of interest to me)
	sample of PCPs taken from AMA Masterfile; 54% response rate (N=482)	Factor analysis, Cronbach Alpha, Pearson's X^2, ANOVA, regression	2 multi-item scales - (1) Patients' access to care in capitated payment plans is reduced and outcomes are compromised (Strongly Disagree to Strongly Agree)	Full list not given - univariate analysis indicated use of the following: board certification, specialty, perceived local market penetration of capitation, duration of practice, type of practice and participation in capitation were all statistically significant predictors of physician attitudes	Both scales had Cronbach Alpha > 0.83; Participation and duration in capitated plans, group practice and board certification predicted perceptions of better access to care for capitated patients
			(2) Beneficial consequences derive from capitated care (Strongly Disagree to Strongly Agree)	Same as above	No significant variables listed
Feldman, Novack, et al. 1998	Mail survey conducted in 1996 in Delaware Valley,	Not clearly described	Specialty and gender	Responders vs. nonresponders	Similar characteristics across 2 groups

Article	Sample	Type of Analysis	Dependent Variables	Independent Variables	Findings (of interest to me)
	PA; sample taken from PCPs in published provider lists of 4 MCOs; 55% response rate (N=559)		What impact do the following managed care limitations make on the quality of patient care? (Negative - Neutral - Positive) (1) length of hospital stay, (2) sites of diagnostic procedures and tests, (3) frequency of visits to specialists, (4) frequency of visits to PCPs, (5) choice of specialists, (7) choice of PCP, and (8) location of hospitalization	Gender	Men responded more positively - small difference but very significant
Fernandez, Grumbach, et al. 2001	Mail survey conducted in 1998 in 13 largest urban counties in CA; sample taken from PCPs in	Frequencies (Methods sections claims that X^2 was used for bivariate comparisons but I couldn't find any)	Disease management program (DMP) impact on (1) overall quality of patient care and (2) quality of care of targeted disease (Greatly Increased to Greatly Decreased)	None	73% reported that disease management programs increased the overall quality of patient care and 75% reported that these programs increase the quality of care for the targeted disease

Article	Sample	Type of Analysis	Dependent Variables	Independent Variables	Findings (of interest to me)
	AMA Masterfile; 71% response rate in 1996 (N=759); sample limited to those with DMP contact (N=178 for these analyses)				
Halm, Causino, et al. 1997	Mail survey conducted in 1996 in Boston, MA;	Not specified	Gender & specialty	Responders vs. non-responders	No significant differences
	sample of MDs serving as both gatekeepers and traditional providers taken from BCBS admin. records;	Difference scores calculated for each respondent; X^2 and *t* tests	Effects of gatekeeping on overall quality of care (Positively to Negatively)	None	Overall quality of care judged to have been negatively affected by gatekeeping, but mean difference was small
	61% response rate (N=202)	Univariate linear regression	Mean difference score for each item	Years in clinical practice	Physicians with fewer years in practice more positive in ratings of gatekeeping's effect on quality, coordination, knowledge and prevention

Article	Sample	Type of Analysis	Dependent Variables	Independent Variables	Findings (of interest to me)
		Univariable logistic regression	Indicator variable for those who rated gatekeeping as better overall than traditional care	Years in clinical practice, % of HMO patients, specialty	Fewer years in clinical practice, generalist training and smaller percentage of HMO patients associated with overall ratings of gatekeeping as better than traditional care
		Multivariable logistic regression	Indicator variable for those who rated gatekeeping as better overall than traditional care	Years in clinical practice, % of HMO patients, specialty	Fewer years in clinical practice was only significant predictor
Reschovsky, Reed, et al. 2001	Community Tracking Study (CTS) Physician Survey;	Not specified	Physician characteristics	Responders vs. non-responders	Differences were seldom more than a few %age points, but several were sig. (perhaps due to large sample size)
	telephone survey conducted in 1996-97; nationally rep. sample of MDs from AMA/AOA Masterfiles	Bivariate and multivariate analyses	Level of agreement with the following statements (Agree Strongly to Disagree Strongly): 1) "I have adequate time to spend with my patients during their office visits."	# of managed care contracts, % practice revenue from managed care, % practice managed care revenue from capitation, market-	21-31% disagreed with positively worded quality statements; specialists were generally 50% more likely to express concern; # managed care contracts, but not % practice revenue from
	65% response rate (N=12,385)	Sample weighting and weighting of results used for analyses	2) "I have the freedom to make clinical decisions that meet my patients' needs."	level managed care penetration, practice setting, compensation and care management tools	managed care, was negatively associated with perceived quality; higher market-level managed care penetration was associated

Article	Sample	Type of Analysis	Dependent Variables	Independent Variables	Findings (of interest to me)
			3) "It is possible to maintain the kind of continuing relationships with patients over time that promote the delivery of high quality care."	Controls: specialty, gender, foreign medical school, years in practice, multiple practices, practice ownership, %specialists in market, unisurance rate, % practice revenue from Medicaid, % practice revenue from Medicare	perceived quality; physicians in group settings less likely to express concerns than those in solo and 2-physician practices; specific financial incentives and care management tools had limited positive or negative associations with perceived quality
				All listed above (?)	Conceptual framework used - model X^2 (40 df) ranged from 178.54-392.17
Williams, Zaslavsky, et al. 1999	Part of MA Medical Society study; mail survey conducted in 1996-97; 56% response rate (N=1,336); disproportionate probability sample of PCPs from 5 MA	Factor analysis & Cronbach Alpha (all analyses conducted using sampling weights)	All used 5-point Likert response scales (1) Plan evaluations - 6 scales (provider quality, administrative support, enrollee support, perceived autonomy, authorization procedures and clinical guidance) + 3 general satisfaction scales and 1 recommend MCO scale	None	All scales w/ Cronbach Alpha > 0.70 (enrollee support was lowest and authorization procedures was highest)

Article	Sample	Type of Analysis	Dependent Variables	Independent Variables	Findings (of interest to me)
	health plans - 3 plans had 2 different org structures = 8 separate study units		(2) Assessments of management strategies - rules, financial incentives and education/peer influence items all grouped together and asked in 3 different ways leading to 3 scales (influence clinical decision-making, how much do MCOs use and how much do they promote quality of care, as implemented by MCO)	None	2 Cronbach Alpha scores for each scale(?) ranging from 0.72 to 0.81
			(3) Attitudes - 8 items (regarding how physicains should treat patients, pressure from colleagues and what info should be shared with patients)	None	2 patient disclosure items were correlated enough to make a scale w/ Cronbach Alpha = 0.67
		Frequencies	(4) Use of education, rules and incentives	Health plan	Perceived use of incentives was lowest and use of education highest in staff model HMO; in general, use of rules was highest and use of education lowest in IPA, network and mixed model plans

Article	Sample	Type of Analysis	Dependent Variables	Independent Variables	Findings (of interest to me)
			(5) Influence of education, rules and incentives on practice	Health plan	Educational strategies had greatest influence on practice (highest scores for education in staff and group model plans)
			(6) How much do education, rules and incentives promote quality of care, as implemented by MCO	Health plan	Educational strategies promote quality of care to a greater degree than rules or incentives (highest scores for education in staff and group model plans)
		Linear models	3 satisfaction scales	Use of rules, use of education, use of financial incentives, plan effects, physician characteristics, practice characteristics, #denials, risk, %managed care compensation salary, %managed care compensation capitation	35% total variance explained; annual income, %patients in target plan, no risk, and use of education all positively associated w/satisfaction; #hours /week in patient care, #denials, use of rules and use of financial incentives all negatively associated with satisfaction
					Coefficients for plan effects and physician attitudes not shown

Article	Sample	Type of Analysis	Dependent Variables	Independent Variables	Findings (of interest to me)
			Plan evaluations	?	Use of educational strategies was positively associated with plan evaluations, use of rules had significant negative association with plan evaluations, but negative sign on use of financial incentives was not statistically significant
			10 plan evaluation scales (assessed mean differences among plans)	Physician characteristics (specialty, gender, year of graduation, income, years with health plan and attitudes toward medical care); health plan or health plan	Plan differences were significant for all quality ratings and average satisfaction scores. Physician and hospital quality had lowest inter-plan variability while administrative support had the most variability.
				Practice characteristics (#physicians in practice, #patients /week, #hours /week in patient care, #patients /hour, %patients in target plan, %patients in any managed care)	Staff and group model plans tended to have significantly higher quality and satisfaction scores, except for physician and hospital quality

Appendix B

PEHP Survey

[Missing values for items Q1-Q24_4 were coded as follows: 7= don't know; 8= not applicable; 9=refused]

Thinking about your understanding of managed care overall, please indicate your level of agreement with the following statement:

		Strongly Agree	Somewhat Agree	Neutral	Somewhat Disagree	Strongly Disagree
Q1.	Doctors are able to practice excellent medicine in managed care plans	1	2	3	4	5

Based on your experience, please rate the overall quality of the following aspects of (insert plan name):

		Excellent	Very Good	Good	Fair	Poor
Q2A.	clinical capability of primary care physicians	1	2	3	4	5
Q2B.	clinical capability of specialist physicians	1	2	3	4	5
Q2C.	*[Purchasing Coalitions and Medicaid only]* adequacy of the formulary	1	2	3	3	5

[Questions Q3 and Q4 were asked in two different locations. Half the respondents were asked these two questions after Q2c, the other half were asked these questions after Q24 (item names are Q3_24 and Q4_24, respectively). For each respondent, the choice of location was determined randomly.]
Again, thinking about your experiences with (insert plan name), please indicate your level of agreement with the following:

		Strongly Agree	Somewhat Agree	Neutral	Somewhat Disagree	Strongly Disagree
Q3.	I would recommend (insert plan name) to a friend or family member.	1	2	3	4	5
Q4.	I would recommend (insert plan name) to a friend or a family member who needed mental health care.	1	2	3	4	5

Please indicate your level of agreement regarding your experience with patients in (insert plan name).

		Strongly Agree	Somewhat Agree	Neutral	Somewhat Disagree	Strongly Disagree
Q5.	The pressure to see a given number of patients in a day usually interferes with providing high quality patient care.	1	2	3	4	5
Q6.	(Insert plan name) provides accurate information to me to that compares my practice to that of my peers.	1	2	3	4	5
Q7.	(Insert plan name) provides accurate information to my patients on their benefits and the provider network.	1	2	3	4	5

		Strongly Agree	Somewhat Agree	Neutral	Somewhat Disagree	Strongly Disagree
Q8.	(Insert plan name) provides high quality education to patients about clinical issues such as prevention or specific health problems.	1	2	3	4	5
Q9.	I feel pressure from (insert plan name) to encourage my sicker patients to disenroll from the plan.	1	2	3	4	5
Q10.	(Insert plan name)'s efforts to implement clinical guidelines have helped my patients to get better care.	1	2	3	4	5
Q11.	(Insert plan name)'s network of lab and radiology facilities allows me to provide high quality care to my patients.	1	2	3	4	5
Q12.	I am not asked by (insert plan name) to put cost containment ahead of good patient care.	1	2	3	4	5
Q13.	I fear that if I criticize (insert plan name), there may be negative repercussions.	1	2	3	4	5
Q14.	(Insert plan name) allows me to provide high quality care for most patients, but not for those who are really sick	1	2	3	4	5
Q15.	*[Not Asked in Site N]* (Insert plan name)'s policies and practices makes it difficult for me to provide high quality care for patients from minority backgrounds	1	2	3	4	5

Thinking about your experiences with (insert plan name)'s referral and authorization procedures, please indicate your level of agreement with the following statements:

		Strongly Agree	Somewhat Agree	Neutral	Somewhat Disagree	Strongly Disagree
Q16.	My staff spends a reasonable amount of office time obtaining authorizations from (insert plan name).	1	2	3	4	5
Q17.	The mechanism for obtaining authorizations in (insert plan name), interferes with providing high quality care.	1	2	3	4	5
Q18.	Requests for authorizations are processed by (insert plan name) within 48 hours.	1	2	3	4	5

		Strongly Agree	Somewhat Agree	Neutral	Somewhat Disagree	Strongly Disagree
Q19.	(Insert plan name) provides timely and effective mechanisms to appeal authorization decisions.	1	2	3	4	5

The following statements have to do with specialty care and continuity of care in (insert plan name). Please rate your level of agreement.

		Strongly Agree	Somewhat Agree	Neutral	Somewhat Disagree	Strongly Disagree
Q20.	Patients who really need to see a specialist are able to see one promptly.	1	2	3	4	5
Q21.	Primary care physicians in (insert plan name) often delay specialty referrals longer than they should.	1	2	3	4	5
Q22.	The plan has the necessary range of specialists available for referral.	1	2	3	4	5
Q23.	The plan's administrative practices enhance continuity of care for my patients.	1	2	3	4	5

The following is a list of some things health plans do to help physicians provide better care. Please rate these for (insert plan name):

		Excellent	Very Good	Good	Fair	Poor
Q24A.	Letting you know which patients need preventive services (e.g., mammograms and immunizations).	1	2	3	4	5
Q24B.	Providing case managers for patients with complex problems.	1	2	3	4	5
Q24C.	*[Medicare and Medicaid Only]* Facilitating high quality care at the end of life.	1	2	3	4	5
Q24D.	*[Medicare and Medicaid Only]* Providing translator services	1	2	3	4	5
Q24E.	*[Medicare and Medicaid Only]* Providing transportation	1	2	3	4	5

[Half the sample was asked the following two questions, Q3_24 and Q4_24, the other half was asked the same questions located earlier in the survey, Q3 and Q4]
Again, thinking about your experiences with (insert plan name), please indicate your level of agreement with the following:

		Strongly Agree	Somewhat Agree	Neutral	Somewhat Disagree	Strongly Disagree
Q3_24.	I would recommend (insert plan name) to a friend or family member.	1	2	3	4	5
Q4_24.	I would recommend (insert plan name) to a friend or a family member who needed mental health care.	1	2	3	4	5

Q25. Within the past 6 months, how many times has (insert plan name) denied coverage for services that you believe were medically necessary for your patients? (fill in number) __ __ __ times

997 don't know
998 not applicable
999 refused

Q26. Do you consider the majority of your practice to be primary care or specialty care?

1 primary care
2 specialty care
3 50% primary and 50% specialty care

7 don't know
8 not applicable
9 refused

27. *[Not Asked in Site N]* What percentage of your practice is primary care?
[Interviewer was instructed to start by probing for a percent then, if unable to identify a percent value, to probe for a range]

Q27A. Type of response:
01 percent → **go to Q27b**
02 range → **go to Q27c**

97 don't know
98 not applicable
99 refused

Q27B. ____ ____ ____ (percent if percent was given) → **go to Q28a**
997 don't know
998 not applicable
999 refused

Q27C. ____ ____ ____ (low percent if range was given) → **go to Q27d**
997 don't know
998 not applicable
999 refused

Q27D. ____ ____ ____ (high percent if range was given) → **go to Q28a**
997 don't know
998 not applicable
999 refused

28. What percentage of your patients are in managed care plans?
[Interviewer was instructed to start by probing for a percent then, if unable to identify a percent value, to probe for a range]

Q28A. Type of response:
01 percent → **go to Q28b**
02 range → **go to Q28c**

97 don't know
98 not applicable
99 refused

Q28B. ____ ____ ____ (percent if percent was given) → **go to Q29a**
997 don't know
998 not applicable
999 refused

Q28C. ____ ____ ____ (low percent if range was given) → **go to Q28d**
997 don't know
998 not applicable
999 refused

Q28D. ____ ____ ____ (high percent if range was given) → **go to Q29a**
997 don't know
998 not applicable
999 refused

29. What percentage of your patients are in (insert plan name)?
[Interviewer was instructed to start by probing for a percent then, if unable to identify a percent value, to probe for a range]

Q29A. Type of response:
01 percent → **go to Q29b**
02 range → **go to Q29c**

97 don't know
98 not applicable
99 refused

Q29B. ____ ____ ____ (percent if percent was given) → **go to Q30**
997 don't know
998 not applicable
999 refused

Q29C. ____ ____ ____ (low percent if range was given) → **go to Q29d**
997 don't know
998 not applicable
999 refused

Q29D. ____ ____ ____ (high percent if range was given) → **go to Q30**
997 don't know
998 not applicable
999 refused

Q30(AGE). Age: ____ ____ years old

97 ? (don't know?)
99 refused

Q31(GENDER). Gender *[Interviewer was instructed to code gender if "obvious"]*:

1 female
2 male

7 don't know
8 not applicable
9 refused

Q32. How long have you practiced with this plan? ____ ____ years

97 don't know
98 not applicable
99 refused

Q33. What best describes the majority of your practice?

1 solo
2 single specialty
3 multi-specialty
4 staff HMO

7 don't know
8 not applicable
9 refused

Q34A. On a scale of 1 to 10, please rate Plan 1 according to its overall quality with 1 being the lowest level of quality, and 10 being the highest overall quality.

	Low									High	No Basis To rate (Volunteered)
Plan 1	1	2	3	4	5	6	7	8	9	10	11

97 don't know
98 not applicable
99 refused

Q34B. On a scale of 1 to 10, please rate Plan 2 according to its overall quality, with 1 being the lowest level of quality and 10 being the highest overall quality.

	Low									High	No Basis To rate (Volunteered)
Plan 2	1	2	3	4	5	6	7	8	9	10	11

97 don't know
98 not applicable
99 refused

Q34C. On a scale of 1 to 10, please rate Plan 3 according to its overall quality, with 1 being the lowest level of quality and 10 being the highest overall quality.

	Low									High	No Basis To rate (Volunteered)
Plan 3	1	2	3	4	5	6	7	8	9	10	11

97 don't know
98 not applicable
99 refused

Q35A. *[Asked in Site N only]* If you could change one thing about (insert plan name), what would it be?

1 this question is in the survey
2 this question is NOT in the survey

35OPEN. If you could change one thing about (insert plan name), what would it be?_____(recorded outside the CATI system)

Q37. *[Asked in Site D Only]* (Insert plan name) has an effective system to coordinate care between primary care physicians and specialists.

1 strongly agree
2 somewhat agree
3 neutral
4 somewhat disagree
5 strongly disagree

7 don't know
8 not applicable
9 refused

Q38. *[Asked in Site D Only]* Are you aware of the Colorado Clinical Guidelines Collaborative that is coordinating guidelines amongst health plans and physician groups?

1 yes
2 no

7 don't know
8 not applicable
9 refused

39A. *[Asked in Site D Only]* Are you currently using clinical guidelines that have been developed by (please check all that apply):

(If a value appears in any of the following columns in the dataset, then it was "checked" by the respondent)

Q39A.1 Health plans
Q39A.2 Colorado Clinical Guidelines Collaborative
Q39A.3 Not using clinical guidelines
Q39A.4 Other (please specify) _____
Q39A.5 None of the above

END OF SURVEY

Appendix C. Process of Creating Clinic Variable for HLM Analysis

Part I. Overview of PEHP Sampling Process

The purpose of the PEHP sampling plan was to prepare the original electronic health plan directories for sampling. The electronic directory cleaning process included, (1) identification of ineligible provider listings and duplicate provider listings within a directory and, (2) combining the separate health plan electronic directory files (within a site) into sampling files. The 'original electronic directories' refers to the electronic directory files as they were given to the PEHP project for the purpose of sampling. 'Cleaned electronic directories' refers to the original files after they were cleaned and prepared for sampling by the PEHP project.

New York sampling was conducted using six individual plan/specialty files and duplicates across health plans identified after sampling. Florida sampling was conducted from two specialty files and duplicates between files identified after sampling. For the remaining three sites (Colorado, Washington and Pennsylvania) sampling was conducted from a single file.

A more refined cleaning process was developed during the cleaning of New York and Florida provider lists. Some of the changes made during this development period have consequences for creating a clinic variable. The purpose of the clinic variable is to identify providers who are working together in the same clinic (for nesting in the hierarchical modeling analysis) and to get an approximate count of providers in each clinic (for clinic size variable). Beginning with sampling for the Colorado site a new variable was created called 'elim" that allowed for identification of cases that were eligible for sampling and four categories of ineligible cases.

'elim' categories include

1 = eligible for sampling
2 = ineligible, focus group participant or medical director/administrator of a health plan in the study
3 = ineligible, duplication across health plans (see following section "Step 3 – Sampling")
4 = ineligible, excluded areas of practice (radiologists, emergency room physicians, anesthesiologists, and pathologists, a.k.a. REAPs, non-physicians, mental health providers and out-of-area providers)
5 = ineligible, duplication within health plan

Use of the 'elim' variable allowed ineligible provider listings to remain in the cleaned files. Since New York and Florida sampling were conducted prior to the implementation of the 'elim' variable, all eliminated providers were deleted from these sampling files in the cleaning process.

Part II. Descriptive Information on Available Electronic Directory Data

In order to evaluate the fitness of the PEHP electronic directory data for creating clinic variables and to determine which files to use, the original uncleaned files as they were given to the PEHP project were reviewed and compared to the files used for sampling (after cleaning) to see how much data was lost in the cleaning process. Descriptions and

statistics on the original files and their cleaned counterparts are organized by site. Information regarding the status of data that may be useful in creating clinic variables (clinic, street address, city, state, zip code, area code and phone number) is included. Also, the status of PEHP_ID is described because it is important to the process of linking electronic directory data with response data.

New York

N=26,769 in cleaned files (n=36,304 in six original uncleaned files) with >50% missing phone numbers because Oxford provider lists came without phone number data. This was the first site sampled so the process was still being developed. Unlike the other sites, sampling was done separately for each health plan, duplicates across plans were not identified until initial sample was drawn and PEHP_ID was assigned after sampling. Therefore, these files need to be re-created in order to calculate clinic variables for this site.

1) Aetna N=10,915 (n=11,015 in three original uncleaned files) almost no missing phone numbers (4 in cleaned specialist file and 3 with extra digits in generalist file), clinic data is mixed in with address data, area codes need to have "-" dropped from beginning of number if using the Excel files but not a problem if using SPSS.sav files
2) HIP N=1176 (n=1279 in one original uncleaned file) no missing phone numbers, address data is mixed in with clinic data
3) Oxford N=14,678 (n=24,010 in two original uncleaned files) no phone numbers, clinic data is mixed in with address data

NY Notes:

For the purposes of this dissertation, a single file was created from the 6 original uncleaned directories. Because of the extent of missing phone numbers in the Oxford file, phone numbers cannot be used in identifying clinic association. Only address data can be used for this site. PEHP_ID data will have to be combined using name matching after cleaning and creation of new clinic variables is complete.

Florida

N=5664 in cleaned files (n=9456 in three original uncleaned files) with 26 missing phone numbers (<1%). This was the second site sampled and the process of combining the provider lists was first implemented and refined but ineligible provider listings were still deleted from the files as they were for the New York files. Therefore, REAPs, same provider working at multiple clinics and clinic data included as separate providers were lost in the cleaning process. Sampling was conducted using a single file for generalists and a single file for specialists. Then duplicates across the two were identified and re-sampling was done where necessary.

1) United N=2284 (n=4029 in one original uncleaned file) 4 missing phone numbers, no zip codes in file, some clinic data was listed as separate providers and lost in the cleaning process

2) PCA N=2090 (n=4086 in one original uncleaned file) 11 missing phone numbers, some clinic information is mixed in with address data and some clinic information is listed as individual providers and lost in the cleaning process, full names were in last name data in original uncleaned files but fixed in cleaned files
3) Staywell N=1290 (n=1341 in one original uncleaned file) 11 missing phone numbers, clinic data is present and separate from address data

FL Notes: For the purposes of this dissertation, a single file was created from the 2 cleaned generalist and specialist files. Possible future investigations could explore deleted clinic data to see if there is additional information for identifying clinic/medical group associations.

Colorado

N=8949 in cleaned files (n=15,230 in four original uncleaned files) with 580 (6.5%) missing phone numbers. This was the first site where an elimination code was used to identify ineligible providers and most of these provider listings remained in the file through the cleaning process (n=6264 clinic or medical group listings were removed from the BCBS file). After sampling was completed and the survey administrator sent the first round of letters to the sampled providers the PEHP team was notified of a problem with the Kaiser provider data. Upon further investigation it became clear that prior to the submission of the Kaiser provider listings to the PEHP project a re-assignment of last names had taken place in one of the two files. In the process of correcting the problem duplication across plans had to be re-checked. While duplication of generalists between Kaiser and the other two plans was rare because of the nature of how Kaiser operates, duplication across specialists was more common. It is unclear how health plan assignments were handled when a survey center letter had already been sent to a newly identified duplicate.

1) BCBS N=6169 in cleaned file (n=12,433 in one original uncleaned file) some missing phone numbers, no data in clinic column but n=6264 possible clinics or medical groups entered as individual providers and dropped from cleaned file.
2) Kaiser N=1009 in cleaned and corrected file (n=1026 in two original uncleaned and corrected files, n=1008 in original uncorrected files so 18 new providers appeared in the two new and corrected files supplied by the health plan - all of which appear in the cleaned and corrected file used for sampling). Overall the clinic, address and phone number data is fairly complete.
3) PacifiCare N=1771 in cleaned file (n=1771 in one original uncleaned file), no missing phone numbers, no data in clinic column but an additional column of data called “Primary PMG” which may be clinic or medical group information, also 8 clinics listed as individual providers but not removed from file in cleaning process

CO Notes:

The cleaned electronic directory file used by the PEHP project for sampling was used for this site. Again, possible future investigations could explore deleted clinic data to see if there is additional information for identifying clinic/medical group associations.

Pennsylvania

N=6141 in both cleaned and original uncleaned files with <1% missing phone numbers and area codes. No clinic data was included in the original file. The health plan provider lists were given to the PEHP project in one file so there are no additional files to check for lost providers due to the cleaning process.

1) Aetna-Pitt N=3262
2) Aetna-Phil N=2879

Washington

N=8208 in cleaned list (n=15,957 in seven original uncleaned files) with n=6322 (77%) missing phone numbers. Since NYL is the only original file missing phone numbers it appears that many others were lost in the cleaning process. The loss was most likely due to the inconsistent format of phone number data across the original uncleaned files.

1) CHPW N=1556 in cleaned list (n=2921 in 3 original uncleaned files) good clinic data and a few missing phones (n=155), some clinics listed as individual providers
2) Group Health of Puget Sound N=483 in cleaned list (n=1069 in one original uncleaned file) good clinic and phone data (1 missing phone number)
3) NYL N=2909 in cleaned list (n=5894 in one original uncleaned file) no phone numbers in this file but good clinic data
4) PacifiCare N=2427 in cleaned list (n=4143 in one original uncleaned file) good phone number and clinic data, some extra zip code data in original file, 7 missing phone numbers and 3 missing one digit in phone number
5) Providence Medicare N=833 in cleaned list (n=1930 in one original uncleaned file) good clinic and phone number data, 3 missing phone numbers

WA Notes:

There is no file for Washington that contains all the 'elim' codes (missing '2', '4', & '5') and PEHP_ID. It appears that sampling was done from a file after the 3 missing elim codes were dropped. Need to check on the 'plan' vs. 'plancode' discrepancies in 'workwash82595.sav' file and investigate loss of phone number data.

Conclusions

The primary goal of cleaning provider lists for the PEHP project was very different from the goal of cleaning for this dissertation. Namely, the PEHP project wanted to avoid sampling providers that did not fit their geographic, degree, and specialty requirements for eligibility. Thus, missing data anywhere in the provider listing was often a reason for exclusion. In contrast, the goal of this dissertation is to identify and quantify all possible physicians working in the same clinic as another PEHP survey respondent. Because these goals were fundamentally different, I decided to include all providers appearing in original directories whenever possible.

Ideally, the clinic-level variables to be used in the HLM analysis would be determined using files that contain all possible providers and have PEHP_ID data for linking with survey response data. This was possible with available data for only two of the five sites in the PEHP survey: Colorado and Pennsylvania. Options needed to be weighed regarding what files to use for New York, Florida and Washington. For New York, PEHP_ID data was not present in any cleaned files so the uncleaned files were preferable. For Florida, the cleaned files were preferable because they contain PEHP_ID information for linking with survey response data. After evaluating all available files for Washington, it was dropped from the HLM analysis due to missing PEHP_ID and phone data.

Part III. Preparing Files for HLM Analysis

After selection of sampling files to be used in the analysis was complete they needed to be substantially modified before proceeding with the HLM analysis. The following description applies to the process of preparing the New York files. The process for preparing the files for the other three sites started at #5.

The following steps were used to guide the process of provider directory list cleaning:

1) Convert original uncleaned files to SPSS format and check to see that all cases and data convert accurately
2) Develop a standard format for files within a site to prepare for merging files
3) Make changes to each file to ensure that all match the standard format for each site
4) Merge all the files within a site in SPSS and create source variables to allow for identification of the file from which each case originated
5) Convert name, clinic, street address, city, state and county data to uppercase letters to increase the probability of finding address matches across provider directories
6) Create a variable for identification of providers with degrees other than MD, DMD and DO for future filtering
7) Create a variable for identification of provider listings in locations outside the counties included in PEHP sampling for future filtering
8) Create a second specialty variable to retain multiple specialty information when filtering duplicates
9) Create a new set of health plan variables to identify providers who appeared in multiple directories when filtering duplicates
10) Sort by clinic and street address
11) Drop unnecessary characters from clinic and address data, such as periods, commas, dashes, leading spaces, leading '@' and '#' symbols
12) Replace long address words for standard abbreviations using a list of common abbreviations (www.dragonrest.net/tools/address.html)
13) Shift street address and clinic name data to appropriate columns where necessary
14) Convert file back to SPSS format

The final steps in preparation for HLM analysis involved creating clinic assignments and adding new clinic and health plan variables to survey response data. Phone and address data were used to make clinic associations in Colorado, Pennsylvania and Florida files. Only address data was available for New York and Washington due to missing phone numbers.