Causal Relationships between Nurse Specialty Subcultures and Patient Outcomes in Acute Care Hospitals

Anastasia A. Mallidou[1]

Greta G. Cummings [2]

Carole A. Estabrooks[3]

Phyllis B. Giovannetti[4]

Corresponding author:
Dr. Anastasia Mallidou
5-112 Clinical Sciences Building
Faculty of Nursing, University of Alberta
Edmonton, AB T6G 2G3
Tel: +1 780 492 8475
Fax: +1 780 492 6186
E-mail: anastasia.mallidou@ualberta.ca

[1] Postdoctoral Fellow, Faculty of Nursing, University of Alberta, Edmonton, Alberta, Canada
[2] Associate Professor, Faculty of Nursing, University of Alberta, Edmonton, Alberta, Canada; Population Health Investigator, AHFMR; and New Investigator, CIHR
[3] Professor & Canada Research Chair, Faculty of Nursing, University of Alberta, Edmonton, AB, Canada
[4] Professor Emerita, Faculty of Nursing, University of Alberta, Edmonton, Alberta, Canada

ABSTRACT

Background: Hospital organizational culture is widely held to matter to the delivery of services, their effectiveness, and system performance in general. However, little empirical evidence exists to support that culture affects provider and patient outcomes; even less evidence exists to support *how* this occurs.

Objectives: To explore causal relationships and mechanisms between nursing specialty subcultures and selected patient outcomes (i.e., quality of care, adverse patient events).

Methods: Martin's differentiation perspective of culture (nested subcultures within organizations) was used as a theoretical framework to develop and test a model. Hospital nurse subcultures were identified as being reflected in formal practices (i.e., satisfactory salary, continuing education, quality assurance program, preceptorship), informal practices (i.e., autonomy, control over practice, nurse-physician relationships), and content themes (i.e., emotional exhaustion). A series of structural equation models were assessed using LISREL on a large nurse survey database representing four specialties (i.e., medical, surgical, intensive care, emergency) in acute care hospitals in Alberta, Canada. Participants (registered nurses) had to be employed in one of the four specialties for at least one year; each specialty had to provide at least three respondents; and each hospital had to provide respondents in all four specialties.

Results: Nursing specialty subcultures differentially influenced patient outcomes. Specifically, quality of care a) was affected by nurses' control over practice, b) was better in intensive care than in medical specialties, and c) was related to lower adverse patient events; nurses in intensive care and emergency specialties reported fewer adverse events than did their counterparts in medical specialties.

Conclusions: Understanding the meaning of subcultures in clinical settings would influence nurses and administrators efforts to implement clinical change and affect outcomes. More research is needed on nested subcultures within healthcare organizations for better understanding differentiated subspecialty effects on complexity of care and outcomes in hospitals.

Keywords: adverse patient outcomes, hospital, nurse specialty subcultures, organizational culture, patient safety, structural equation modeling.

What is already known about the topic?

- Organizations consist of multiple subcultures, which influence employee quality of work life and organizational outcomes.
- Healthcare organizations are characterized by distinct disciplines (e.g., medical, nursing, etc.), but they lag behind in exploring their own cultures and subcultures.
- A few studies found an association between hospital subcultures and selected nurse and patient outcomes.

What this paper adds?

- Nurse specialty subcultures do exist within acute hospitals in Alberta.
- Nurse specialty subcultures (cultural manifestations) have similarities, differences, and differential causal effects on quality of care, job satisfaction, and adverse patient events.
- Collaboration and teamwork (informal practices, processes) lead to quality outcomes, while formal practices have less influence on patient outcomes and quality of care than processes do.

INTRODUCTION

Organizations consist of multiple and overlapping subcultures that have significant consequences for employees' quality of work life, and for organizational performance (Eisenberg et al., 2001; Shortell et al., 2000). Usually, subcultures tend to form around areas of differentiation within organizations, such as functional units, geographical divisions, managerial hierarchy levels, and professional specialties (Schein, 1992). Interestingly, however, research has not extended into organizational culture in the healthcare sector (Eisenberg et al., 2001). Probably because the organizational culture literature poses several challenges. For example, a great variety of theoretical and operational definitions of organizational culture are in use, resulting in inconsistent and sometimes incompatible definitions across streams of research. Investigators use a variety of terms (e.g., climate, practice environment) to represent similar or identical organizational phenomena (del Bueno and Vincent, 1986; Sleutel, 2000) and a variety of epistemological approaches in studying organizational culture (Smircich, 1983).

Although studying subcultures of an organization is an appropriate way to understand its complexity, few have suggested ways to express subcultures within organizations conceptually (Frost et al., 1991; Martin, 1992; 2002). Martin (Martin, 2002), in her influential review of organizational research relating to culture, conceptually defined organizational culture as being drawn to *aspects of organizational life* that have been studied (e.g., official policies, various salaries, reporting relationships) or often been ignored (e.g., stories people tell to newcomers, office arrangements, displayed or not personal items, jokes) but definitely describe *how things are* in the workplace. What is important is not the cultural manifestation itself but *how employees interpret it*, so researchers can in depth understand the patterns of meanings. She also analyzed a number of conceptual and operational definitions of organizational culture and described its

components (manifestations). Three dominant social scientific perspectives represented in cultural studies were identified: The *integration* perspective focuses on a shared organization-wide consensus where cultural manifestations are interpreted consistently. The *differentiation* perspective focuses on organizations as multicultural entities with subcultures nested within them. Cultural manifestations are not consistently interpreted. Ambiguity is channelled outside the boundaries of and between subcultures, while clarity exists within subcultures that are like islands of clarity in a sea of ambiguity (Martin, 2002). Subcultures coexist and interact in harmony, in conflict with each other, or independently. The *fragmentation* perspective focuses on organizations in which consensus among cultural members does not exist.

Healthcare organizations are heavily dominated and characterized by distinct disciplines (e.g., medical, nursing, managerial). Consequently, from these different professional views as well as from other factors (e.g., unit configurations, staffing, etc.) various perspectives exist and different subcultures can be developed as causes of clinical practice variation (Degeling et al., 2001). In nursing cultural studies, Coeling and Simms (1993a; 1993b; 1996) argued that subcultures do exist within hospitals, but only at the nursing unit level (with geographical boundaries), which is the most common unit of analysis. However, in each nursing unit there are several other subcultures such as occupational (registered nurses, physicians, licensed practical nurses, clerk, housekeeping personnel, etc.), day/night shift, specialty (medical, surgical, etc.) and so on that overlap each other. Between and within nursing subcultures varying goals, motivations, and conflicts exist (Kinnunen, 1990). Their differences indicate diverse changes in health policy; various management strategies for conflict resolution, staff development, and organizational change; and differential impact on nurse and patient outcomes.

Nurse outcomes, predominantly job satisfaction (Avallone and Gibbon, 1998; McDaniel and Stumpf, 1993; Thomas et al., 1990; Tzeng, 1997), nurse absenteeism (Seago, 1995), turnover (Gifford et al., 2002; Kratina, 1990; McDaniel and Stumpf, 1993), intention to leave (Gifford et al., 2002; Seago, 1995), and hostility (Seago, 1996) were studied in terms of how they were affected by hospital subcultures. As patient outcomes, patient satisfaction with nursing care was most often examined mainly associated with nurse job satisfaction (Lageson, 2001; Tzeng, 1997) and overall quality of care (Lageson, 2001; Zimmerman et al., 1993). Also, adverse patient events (e.g., mortality, medication errors, patient falls, nosocomial infections) have been examined in association with hospital characteristics (Estabrooks et al., 2005; Shortell et al., 2000). These incidents often occur in nursing units and are routinely monitored in hospitals (Leape et al., 1991; Mark and Burleson, 1995; Thomas et al., 2000).

The purpose of this study was to develop and test a theory in nurse specialty subcultures (NSSCs) and to identify *how* their cultural manifestations differentially affected job satisfaction, quality of care, and adverse patient occurrences. The research questions were: "Do NSSCs exist within acute care hospitals in Alberta?" and "How do NSSCs affect nurse and patient outcomes in acute care hospitals in Alberta?" Studying organizational culture is important because it not only describes the structural and process characteristics of a working environment, but also examines its values, beliefs, and assumptions and shapes behaviors that influence actions, practices, and outcomes (Schein, 1992).

The Conceptual Model

Martin's (2002) operational definition of organizational culture includes three components representing ideational and materialist cultural manifestations as aspects of organizational life: practices (formal and informal), content themes, and cultural forms. *Formal*

practices refer to written rules such as formal hierarchical reporting structures, task and technology, rules and procedures (e.g., continuing education, quality assurance programs, preceptorship), and financial schemes (e.g., satisfactory salary) as the most important type of formal practices because they involve highly restricted kinds of information. *Informal practices* (processes) are behavioral norms referring to unwritten guidelines that take the form of social rules, which express employees' interpretations of the meaning of their surroundings (e.g., autonomy, control over practice, relationships with colleagues). Formal and informal practices have been studied extensively, as they are highly meaningful and significant in understanding organizational culture.

Content themes (cognitive or attitudinal) underlie the interpretations of cultural manifestations expressed at various levels of abstraction such as espoused values and inferred values, and emotional concerns. Sometimes, espoused and inferred values are inconsistent; espoused values are usually a superficial interpretation of manifestations in order to impress an audience or to influence organizational reputation, while inferred values, a deductive interpretation of cultural manifestations, reflect a deep level of interpretation. Emotional concerns are inferred themes, job-related emotions referring to a deeper level of employees' interpretations of their work environment. Cultural studies can focus on one or more types of content themes.

Cultural forms are artifacts (e.g., rituals, organizational stories, jargon, humor, physical arrangements) that have traditionally been discarded as esoteric and relatively trivial cultural manifestations.

Based on Martin's (2002) differentiation perspective and our experiences, we developed a theoretical model that deals with the effects of cultural manifestations of hospital NSSCs (causal variables) on job satisfaction (nurse outcome) and quality of care and adverse patient events

(patient outcomes). In our model, job satisfaction and quality of care were intervening causal variables; adverse patient events was the outcome variable. Cultural manifestations of NSSCs were identified as nurses' perceptions of their practice environment being reflected in formal practices, informal practices, and content themes such as emotional concerns. We did not include artifacts in our definition because we did not have data to measure them.

Job satisfaction was defined as an attitudinal state and/or nurse feelings derived from her/his perception that the current job conditions are satisfying (Blegen and Mueller, 1987; Kramer and Hafner, 1989). Nurse job satisfaction has been extensively studied as an important indicator of quality of care and cost savings (Davidson et al., 1997). Job dissatisfaction has been found to be causally associated with lower productivity, higher absenteeism, increased work-related errors, and job turnover (Blegen and Mueller, 1987; Buiser, 2000). In contrast, determinants of job satisfaction included experience, full-time/part-time employment, type of unit, salary, autonomy (Blegen and Mueller, 1987), and organizational climate (i.e., responsibility, warmth, support, and identity) (Gillies et al., 1990). Magnet hospitals have been widely recognized as the ideal setting for higher levels of nurse job satisfaction (Kramer and Hafner, 1989; Kramer and Schmalenberg, 1988a; 1988b).

Quality of care was defined as the balance of expected gains (benefits) and losses (harms) arising from the care process. Overall, quality of nursing care affects patients' health status, their quality of life, length of stay (Aiken et al., 2002), while better nurse practice environments suggest higher quality of care (Aiken et al., 2008).

Adverse patient events refer to undesirable but preventable patient occurrences such as medication errors, patient falls, and nosocomial infections. Evidence indicates that more experienced nurses had fewer medication errors and patient falls (Blegen et al., 2001); and a

higher proportion of hours of care delivered by RNs was inversely related to the unit rates of medication errors, pressure ulcers, and patient complaints (Blegen et al., 1998). The best way to capture the richness of the concept is to monitor all undesirable incidents for a specific period of time. In this study, the conceptual model (summarized in Figure 1) includes medication errors, patient falls, and nosocomial infections.

Medication errors are a multidisciplinary problem, but medication administration is an integral part of nurses' role, approximately 40% of nurses' time (Armitage and Knapman, 2003), during which 34% of medication errors occur (Bates, 1995). About 30% of injuries due to medications in hospitals are associated with a preventable medication error (Bates, 1996), which significantly prolonged length of stay (Bates et al., 1997), and increased economic burden (Bates et al., 1997) and risk of death (Classen et al., 1997). Nurses and their interventions are directly associated with patient outcomes (Institute of Medicine, 2004; Kahn et al., 1990; Mitchell and Shortell, 1997), since their vigilance prevents or intercepts errors. Of all medication errors made by physicians, 86% were intercepted by nurses before the error reached the patient (Leape et al., 1995).

The incidence of patient falls over a one-year period in a metropolitan hospital was 2.3 per 100 patient bed-days (Morse et al., 1985). Patients who fell sustained minor injuries (25%) and a concussion or fracture (3.6%). Although most falls do not result in serious physical injury, they can contribute to a loss of confidence and mobility, which can significantly reduce quality of life (Mitchell and Jones, 1996). Nurses' job stress level and job satisfaction are strongly associated with the occurrence of patient incidents such as patient falls and medication errors (Dugan et al., 1996; Tumulty, 1990).

Nosocomial infections are defined as conditions that result from adverse reactions to the presence of an infectious agent or its toxins that were neither present nor incubating at the time of admission to the hospital (Garner et al., 1996). However, even if nosocomial infections do not result in deaths, they still lengthen hospitalization and increase costs (Weinstein, 1998). Larson (Larson et al., 2000) argued that changing organizational unit culture resulted in significant improvement in hand-washing, which reduced nosocomial infections.

METHODS

This study was a secondary analysis of data from the International Study of Hospital Staffing and Organization on Patient Outcomes (Sochalski et al., 1998) in 1998-99. Researchers from Canada (Alberta, British Columbia, and Ontario), England, Germany, Scotland, and the United States were participated. The international sample included more than 43,000 and the Canadian over 17,000 registered nurses (RNs). Data were collected using a paper survey with a postal return.

Data Sources

The Alberta Registered Nurse Survey, a 14-page questionnaire, was mailed to each nurse's home address, as listed in the 1998 annual Alberta Association of Registered Nurses registry. All 12,345 RNs in 129 hospitals across the 17 health regions (at that time) of the province were included (census). Nurses working in healthcare centers or other facilities, and supervisors were excluded. After three follow-up mailings, the final usable data consisted of 6,526 surveys (response rate: 52.8%) from 109 hospitals (Giovannetti et al., 2002).

In the study reported here, the nurse-reported data were drawn exclusively from the Alberta Registered Nurse Survey based on four inclusion criteria: a) qualifying RNs had to be employed in one of the following specialties: medical, surgical, intensive, and emergency; b) all four

specialties in each hospital had to provide respondents; c) each specialty in every hospital had to provide at least 3 respondents (permanently assigned to that specialty) to obtain satisfactory representativeness (Leveck and Jones, 1996; Verran et al., 1995); and d) each nurse had to be employed in each specialty for at least one year to be able to provide an accurate assessment of the NSSCs.

Sample

The sample included 1,937 RNs employed in one of four specialties within 12 hospitals at the time of data collection. The number of nurses in these four specialties represented 31.60% of the total population of RNs in Alberta in the 1998 registry and they had almost the same likelihood of working in one of the four specialties (29.69% vs. 31.60%). A comparison of the current study's sample (n = 1,937) with the sample of the primary study (n=6,526) found no statistical significant differences among the two samples. The missing values ranged from 0.1% to 3% of the sample.

Instruments and Measurement

We operationalized the cultural manifestations of the NSSCs using *formal practices* of satisfactory salary, continuing education, quality assurance program, and preceptorship; *informal practices* of autonomy, control over practice, and nurse-physician relationships; and the *content theme* (emotional concern) of emotional exhaustion. NSSCs, based on the data available to us (secondary analysis), were measured by the Maslach Burnout Inventory (MBI) (Maslach and Jackson, 1986) and the Nursing Work Index - Revised (NWI-R) (Aiken and Patrician, 2000). From the MBI, a standardized instrument used in numerous studies, the emotional exhaustion subscale was selected, since it is relevant to emotional concerns affiliated with work and has been used in several studies (Aiken and Patrician, 2000; Aiken and Sloane, 1997a).

From the NWI-R, four items relevant to formal practices (i.e., satisfactory salary, continuing education, quality assurance program, preceptorship), and three subscales assessing informal practices (i.e., nurse autonomy, control over practice, and nurse-physician relationships) were selected (Aiken and Patrician, 2000). A detailed description of the classification and justification of each MBI and NWI-R item included in this study is available upon request. The psychometric properties of the NWI-R were published earlier (Aiken and Patrician, 2000; Estabrooks et al., 2002). In this study, the internal consistency of the emotional exhaustion subscale in each of the samples (i.e., overall, medical, surgical, and emergency nurse specialties) was 0.91, and in the intensive was 0.90. The causal variables also included nurse demographic characteristics (i.e., experience and full-/part-time employment) for each of the four NSSCs (Table 1). Medical and surgical subcultures represent nurses employed in specific specialties but not necessarily in the same spatial unit because hospitals usually have more than one nursing unit in these specialties. Conversely, intensive and emergency subcultures often coincide with spatial nursing units within a hospital.

The Four-Group Stacked Model

In this study, we chose to use a 4-group stacked model for simultaneous estimation of each specialty subculture that contained multiple interactions between variables. Some structural coefficients were fixed or constrained (e.g., to be equal) across the groups, while others were allowed to vary. This approach reclaimed extra degrees of freedom that increased the testing power of the model.

We expected to find different effects on each outcome variable across the NSSCs to empirically set up the similarities and differences in nurses' perceptions within these four specialties. Hence, we established several theoretically asserted hypotheses across the four groups

to construct the 4-group stacked model:

1. *Years of experience* varies by specialty and has different impact on job satisfaction and quality of care. Experienced nurses are more likely to work in highly specialized units such as ICU and emergency.
2. The percentage of nurses working full-/part-time varies by specialty.
3. *Satisfaction with salary* also interacts with specialty. For example, nurses working in emergency may be the least satisfied with their salary (Boyle et al., 2006) because they a) have a particularly demanding job, b) are usually more experienced, and c) have more knowledge and self-esteem than nurses in the other specialties, while their salary is no higher than that of other nurses.
4. Even though *continuing education*, *quality assurance program*, and *preceptorship* should be similar in all specialties (hospital-based programs), each specialty has its own in-service programs (Salonen et al., 2007). In particular, nurses working in intensive care and emergency may have more continuing education and preceptorship programs than their counterparts in other specialties, due to the special needs and severe illness of their patients.
5. Levels of *autonomy* and *control over nursing* practice are not the same in all specialties. We expected intensive and emergency nurses to be more autonomous and have more control over their practice than do medical and surgical nurses (Aiken and Sloane, 1997a; 1997b).
6. *Relationships between nurses and physicians* are better in the intensive care and emergency specialties than in the medical or surgical specialties, because the former are highly specialized care units where nurses are specialized professionals working closely

with physicians and teamwork is of vital importance for better patient outcomes (Cummings et al., 2008; Estabrooks et al., 2005).

7. *Emotional exhaustion* levels are not the same in all nurse specialties (Aiken and Sloane, 1997b). We expected nurses in medical and surgical specialties to have higher emotional exhaustion levels than do their counterparts employed in intensive and emergency units.

Ethics Approval

The primary international study does not contain identifying characteristics of nurses, refer to any vulnerable populations, deal with sensitive issues, nor recognize hospital identity in any way. The Alberta study was approved by the University of Alberta/Capital Health Authority/Caritas Health Group Health Research Ethics Board (Panel B). In this study, we dealt with aggregate work environment characteristics on a nurse specialty level. Ethical approval was attained from the Health Research Ethics Board of the University of Alberta.

ANALYSIS

Internal consistency reliability analyses of subscales were conducted for identification of the univariate characteristics of the indicators. Cronbach's alphas for the four subscales (i.e., autonomy, control over practice, RN-MD relationships, and emotional exhaustion) included in the model were computed. All four subscales had favourable psychometric properties. Frequencies, means, standards deviations, cross-tabulations, and scatter-plots of all variables were computed to assess potential outliers; and assumptions of causal modeling analyses (i.e., multivariate normality, non-multicollinearity, and independence of residuals) were checked (Hayduk, 1987). Variables with correlation at or above the criterion level of 0.85 (Tabachnick and Fidell, 1996) were not retained in the model due to potential identification problems.

LISREL 8.5 (Joreskog and Sorbom, 1996) maximum likelihood estimation method was used for model specification, model estimation, and goodness-of-fit assessment. The medical nurse specialty subculture was the reference group (arbitrarily chosen).

We split the overall sample (n=1,937) into four groups of respondents employed in medical (n=564), surgery (n=608), intensive care (n=467), and emergency (n=298). For each group, we used pairwise deletion of the missing values to obtain four covariance matrices containing all the indicators. This resulted in effective sample sizes for the four groups of 544, 588, 456, and 290 cases respectively. Each concept was measured by a single indicator from the survey. All indicators included in each of the four groups, their means, and the indicator measurements are presented in Table 2. The correlation, variance, and covariance matrices for each of the four groups are depicted in Table 3.

Model Estimation and Modifications

We estimated the model and determined which of the relationships between predictor and outcome variables were to be constrained (controlled) to be equal among groups and which were allowed to be free to differ between the groups (Figure 2). Based on our hypotheses, we allowed the medical and surgical groups to have equal estimates for the effects of *continuing education* on *job satisfaction, quality of care*, and *adverse patient events*, as well as, for the effect of quality of care on *adverse patient events*, but not in intensive care and emergency. Also, the effects of *quality assurance program* on *quality of care* and *adverse patient events* were constrained to be equal in the medical and intensive care specialties, but not in surgical and emergency. The remaining 24 effects between the causal, intervening, and outcome variables were allowed to be freely estimated and thereby potentially differ across the four groups. We run the model; the examination of the output for each group revealed that several standardized residuals exceeded an

absolute value of 2.0, which appeared to form a pattern in relation to *satisfaction with salary*. So, the relationship between *satisfaction with salary* and *quality of care* in the medical group only was freed for estimation. The model converged after 50 iterations, resulting in a statistically non-significant chi-square (χ^2=24.18, p=0.115, df=17), suggesting an acceptable fit between the data and the model. The Goodness of Fit Index in each of the four groups was 0.997, 0.998, 0.999, and 0.998 respectively.

RESULTS

The research question "Do nurse specialty subcultures exist within acute care hospitals in Alberta?" has been affirmatively answered, since we found different effects on each outcome variable across the NSSCs. The most important findings to the research question "How NSSCs and their cultural manifestations differentially affect job satisfaction, quality of care, and adverse patient occurrences in acute care hospitals in Alberta?" are summarized next (Table 4):

a. Formal practices (i.e., satisfactory salary, continuing education, quality assurance program, and preceptorship) mainly influence quality of care and adverse patient events. Specifically, satisfactory salary had a negative effect (recursive not reciprocal) on quality of care in medical specialty (-0108). Continuing education had no effect in none of the intervening and outcome variables. In the surgery and emergency, existence of quality assurance program decreased adverse patient events (-0.140 and -0.178 respectively) and improved quality of care in medical (0.082) and intensive (0.086) specialties. Preceptorship was associated with fewer adverse patient events in the intensive specialty (-0.164).
b. Informal practices (i.e., autonomy, control over practice, and nurse-physician relationships) significantly explained outcomes in each specialty. Specifically, professional autonomy

was not an important factor in any of the four specialties; while *control over practice* increased job satisfaction in the surgical and intensive specialties (0.232 and 0.146 respectively), while it was one of the strongest statistically significant factors that improved quality of care in all four groups (0.357 in medical, 0.281 in surgical, 0.303 in intensive, and 0.432 in emergency specialty respectively). Good *relationships between nurses and physicians* increased job satisfaction in intensive (0.215) and emergency (0.120); improved quality of care in medical (0.106) and emergency (0.179) specialties, and reduced adverse patient events in the medical (-0.115) specialty.

c. Emotional exhaustion indicated lower levels of job satisfaction in all four NSSCs (-0.536 in medical, -0.486 in surgical, -0.384 in intensive, and -0.557 in emergency respectively), but increased the incidence of adverse patient events in the medical specialty (0.231).
d. Demographics (i.e., experience and part-/full-time employment): Experienced nurses were less satisfied in the emergency (-0.091) specialty; their lower levels of job satisfaction were associated with fewer adverse patient events in the medical (-0.104) and emergency (-0.136) specialties. *Part-time employment* negatively contributed to nurse job satisfaction in all but emergency specialties (-0.085 in medical, 0.082 in surgery, -0.193 in intensive respectively); and reduced the number of adverse patient events in the surgical (-0.104) and emergency (-0.178) specialties. In our data, 40% of nurses worked full-time (but only 16% of them worked 40 hours per week) and 58% worked part-time (22% of them fewer than 20 hours per week and 14% worked 20-34 hours per week).

Job satisfaction proportion of explained variance ranged from 36% to 52% across specialties, and quality of care and adverse patient events were 24% to 39% and 6% to 17% respectively.

DISCUSSION

The four-group stacked model provided important information about NSSCs, their similarities and differences, and the differential effects of cultural manifestations on selected nurse and patient outcomes across four different specialties. We will discuss the findings based on the formal and informal practices, emotional exhaustion, and demographics.

Formal Practices

"Satisfaction with salary" has not been extensively studied in nursing. Even though in a few studies, salary was a predictor and a motivator for job satisfaction, the degree to which this is the case is debated in the literature. If nurses are dissatisfied with their salary or other rewards, they might be less likely to provide high-quality care and less likely to be retained by the hospital (Lynn and Kelley, 1997). Coile (2001) argued that magnet hospitals use cultures of excellence, not good wages, to attract and retain nurses. As cited in Blegen & Mueller (1987), when nurses were asked to rank the most important factors for their job satisfaction in hospitals, salary was the third (Froebe et al., 1983), sixth (Munro, 1982), or twelfth (Larson et al., 1984) most important factor. Our finding that "satisfaction with salary" had a negative effect on "quality of care" is a puzzling result that we could not readily account for. A possible explanation can be found in Martin's (1994) argument that nursing as a service profession is characterized by intangibility, perishability, variability, and inseparability. She outlined two reasons against linking pay and performance: a) satisfaction with rewards encourages people to focus on tasks and activities, to do them as quickly as possible, and to take fewer risks since the emphasis is on the reward not on the quality of activities; and b) extrinsic rewards can erode intrinsic interest. Neither satisfactory salary nor quality assurance program (associated with more adverse events) can be adequately

explained with the current secondary data. In the future, we may test them again for further explanation.

Informal Practices

The informal practices within organizational life that need no extra money and reduce stress (Frost, 2003) are stronger causal predictors of job satisfaction, quality of care, and adverse patient occurrences than the formal practices. The fact that control over practice was one of the strongest factors affecting quality of care, while professional autonomy was not may be explained by the conceptual confusion between autonomy and control over practice. Kramer and Schmalenberg (2003a; 2003b) argued that the relationships between control over practice, shared governance, and professional autonomy are unclear. The findings on "relationships between nurses and physicians" are consistent with several other studies (Aiken et al., 2002; Cummings et al., 2008). However, the fact that "physician-nurse relationships" was not an important factor for "nurse job satisfaction" in the medical and surgical specialties raises important questions. It may be that nurses in the medical and surgical specialties draw their job satisfaction from other sources; that, for nurses in these units, good relationships with physicians are relevant only to obtain better patient results. Kramer and Schmalenberg (2003c), in a qualitative study to clarify the definition of good nurse-physician relationships, found that the quality of nurse-physician relationships was not consistent throughout a hospital but rather varied by specialty. Nurses in the medical specialty reported that good relationships with physicians were not associated with their job satisfaction, but with better quality of care and fewer adverse patient events. Further research is required to examine why good nurse-physician relations are associated with desired nurse and patient outcomes, and how these relationships act to improve outcomes.

Emotional Exhaustion

In all four specialties, nurses' emotional exhaustion had the strongest causal relationship with the intervening and outcome variables. Nurses in intensive care experienced the lowest level of emotional exhaustion similar to several other studies (Aiken and Sloane, 1997a). Emotional concerns as cultural manifestations capture a deeper level of organizational culture that is difficult to describe (Martin, 1992; Schein, 1992). Emotional pain can be used as a diagnostic tool to identify sources of toxicity and as an important predictor of provider and system outcomes (Frost, 2003). Nurses' emotionality and absenteeism in combination with other catalysts (e.g., coworker and patient behaviors, type of unit, job tension, burnout) resulted in the highest levels of emotional exhaustion, which can have any number of physical, emotional, interpersonal, attitudinal, and behavioral consequences and implications. These implications can affect each individual employee, his or her family and friends, the organization, and clients with whom the employee interacts (Frost, 2003). Further, the fact that emotional exhaustion affected job satisfaction but not quality of care or adverse patient events, may suggest a level of dedication among nurses, who as professionals, push themselves to provide a high level of quality of care and avoid adverse events.

Demographics

Comparing nurse specialties on demographics, we found differences and differential effects across the four groups. For example, years of nursing experience significantly decreased adverse patient events, which is consistent with the existing literature (Blegen et al., 2001). However, this was not the case in the intensive and surgical specialties, which may be due to nurses' acknowledgement of preceptorship as a significant factor for reducing adverse patient outcomes. Similarly, the finding that quality of care, full-/part-time status, and quality assurance programs were associated with increased adverse patient occurrences in the surgery and emergency

specialties may reflect nurses' perceptions of themselves as non-specialized, and thereby, not requiring the same amount of autonomy, control over practice, or good relationships with physicians. In contrast, they may believe that formal practices are adequate and sufficient factors for reducing adverse patient events. A possible explanation for these differences among the four groups is that nurses in each subgroup differ in their assessment of quality of care and in their recall of adverse patient events. These results also indicate that different causal mechanisms may exist among these specialties and NSSCs are indeed nested within hospitals, despite their various locations (nursing units), which are not consistent with Coeling and Simms' (1993a; 1993b) findings.

Limitations

The limitations in our study are related first, to theoretical and methodological issues arising from the secondary data analysis. For example, restrictions upon the studied concepts and populations, potentially imprecise indicators of them, selection biases, and issues related to the representativeness of the primary study (Estabrooks and Romyn, 1995). Hayduk (1987) has argued that the use of structural equation modeling attenuates these limitations by assessing the proportion of error variance in each concept. Second, a representativeness bias concerned us, even though the response rate in the Alberta primary study was favorable and our main interest was internal not external validity.

The third limitation refers to the debatable measurement of organizational culture using an exclusively quantitative approach, which have a tendency to focus on single and discrete elements of culture, ignoring its multidimensional nature (Schein, 1990). However, many quantitative methods studying organizational culture are useful because they offer a panoramic view, while field research provides a complementary view (Golden-Biddle and Rao, 1997). There

is no excuse to leave theories untested because quantitative techniques are not broadly acceptable (Miner, 2002).

The fourth limitation refers to the NWI-R and MBI items, which have not been previously used to measure cultural manifestations (Peters and Waterman, 1982); neither have been used to distinguish units smaller than hospitals, so its ability to distinguish these smaller subcultures within hospitals has not yet been established. Researchers who used the NWI-R claimed to be measuring organizational characteristics, even though Gershon and colleagues (2004) argued that it actually measured organizational climate. Further, the questions in the NWI-R were strictly speaking designed to provide ordinal level responses. Finally, a threat to validity is posed by the self-selection of nurses into hospital specialties.

Theoretical, Clinical, and Research Implications

1. Theoretical: Culture, by definition, is the property of a group of individuals with stable membership, low rates of member turnover, and shared assumptions (Schein, 1992). Small groups (i.e., subcultures) are more likely than the entire organization to share these characteristics; to adopt innovations and change procedures; to have the opportunity to discuss the pros and cons of an innovation and ultimately be convinced of its merit; and to understand the differences among subcultures so they better communicate with one another and respond to differences. Given that organizations are continually evolving (Mackenzie, 1986), there is really no universal theory or paradigm for examining organizational culture, but theories can at least shed light on the complex concept of organizational culture by identifying potential causes and effects between sub-cultural elements and outcomes for a potential suitable theory.
2. Clinical: This study illustrates evidence of the existence of NSSCs nested within hospitals. There are few studies from the differentiation perspective in the healthcare sector and fewer still in the nursing literature. However, the variety of professionals who work there, nursing units and/or

specialties, the patients who spend a significant period of time on the unit, the technology involved in the work, and the physical layout of the workplace all contribute to organizational subcultures.

3. Research: This study offers empirical evidence of the important influences that hospital sub-specialities have on outcomes and the first empirical assessment, of which we are aware, of Martin's theory of culture in health care settings. Our results suggest that her theory provides a promising further inquiry. More research is needed on the nurse-patient relationships and hospital subcultures on patient outcomes. These factors need more attention and closer exploration in order to offer insights into how we might design interventions to improve patient safety and nurses' work life.

CONCLUSIONS

Overall, research on organizational culture in healthcare organizations is underdeveloped. In this study, we found evidence of the existence of NSSCs nested within hospitals that influence nurse and patient outcomes; and that collaboration and teamwork (processes) lead to quality patient outcomes, while formal practices have less influence on patient outcomes and quality of care. Potential causal mechanisms between NSSCs and adverse patient events are an important contribution to our understanding of patient safety that may assist in identifying, describing, developing, and maintaining desired subcultures that improve quality of care.

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Figure 1 – The conceptual model

(The *broken-dashed line* was added in the final model after the modifications)

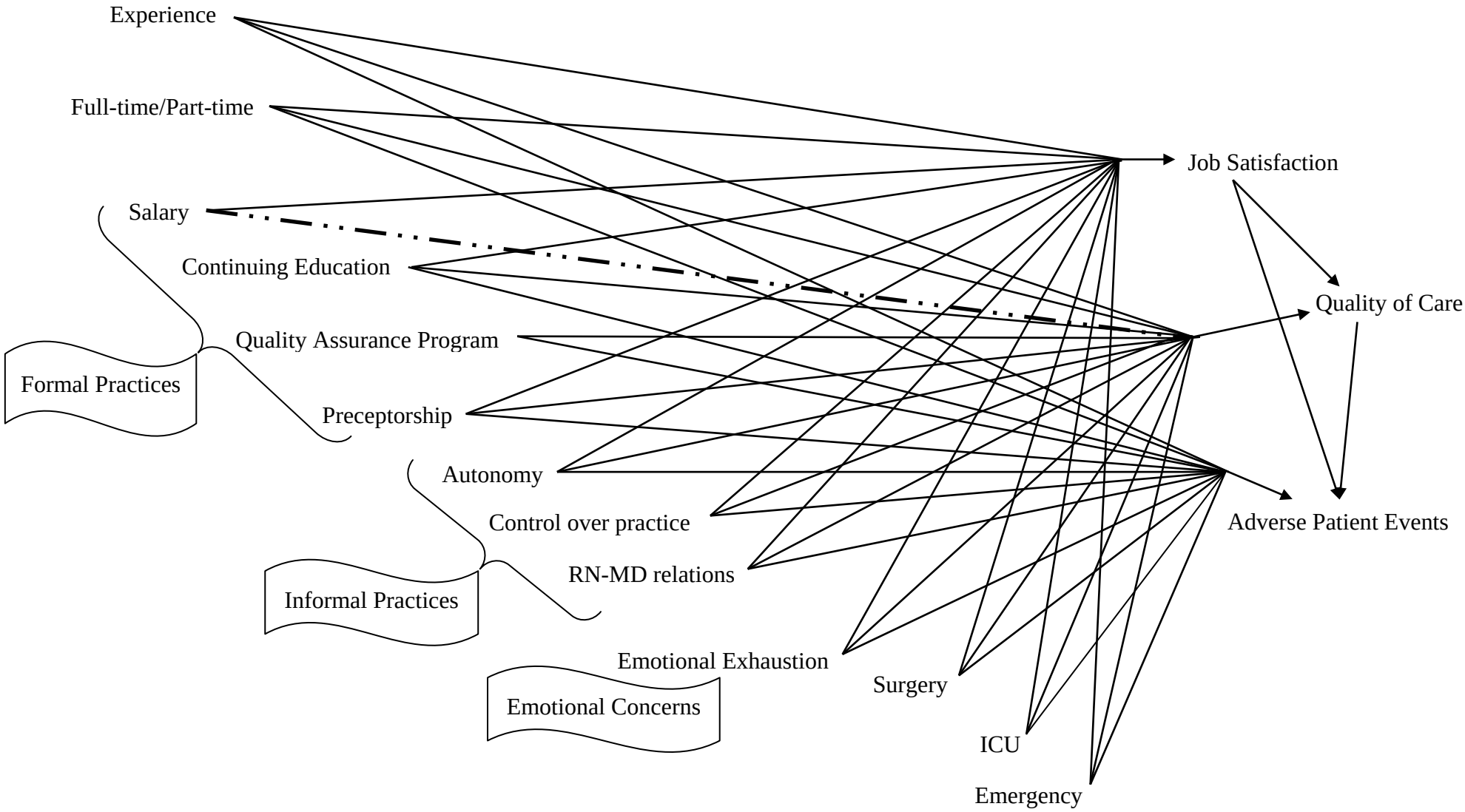
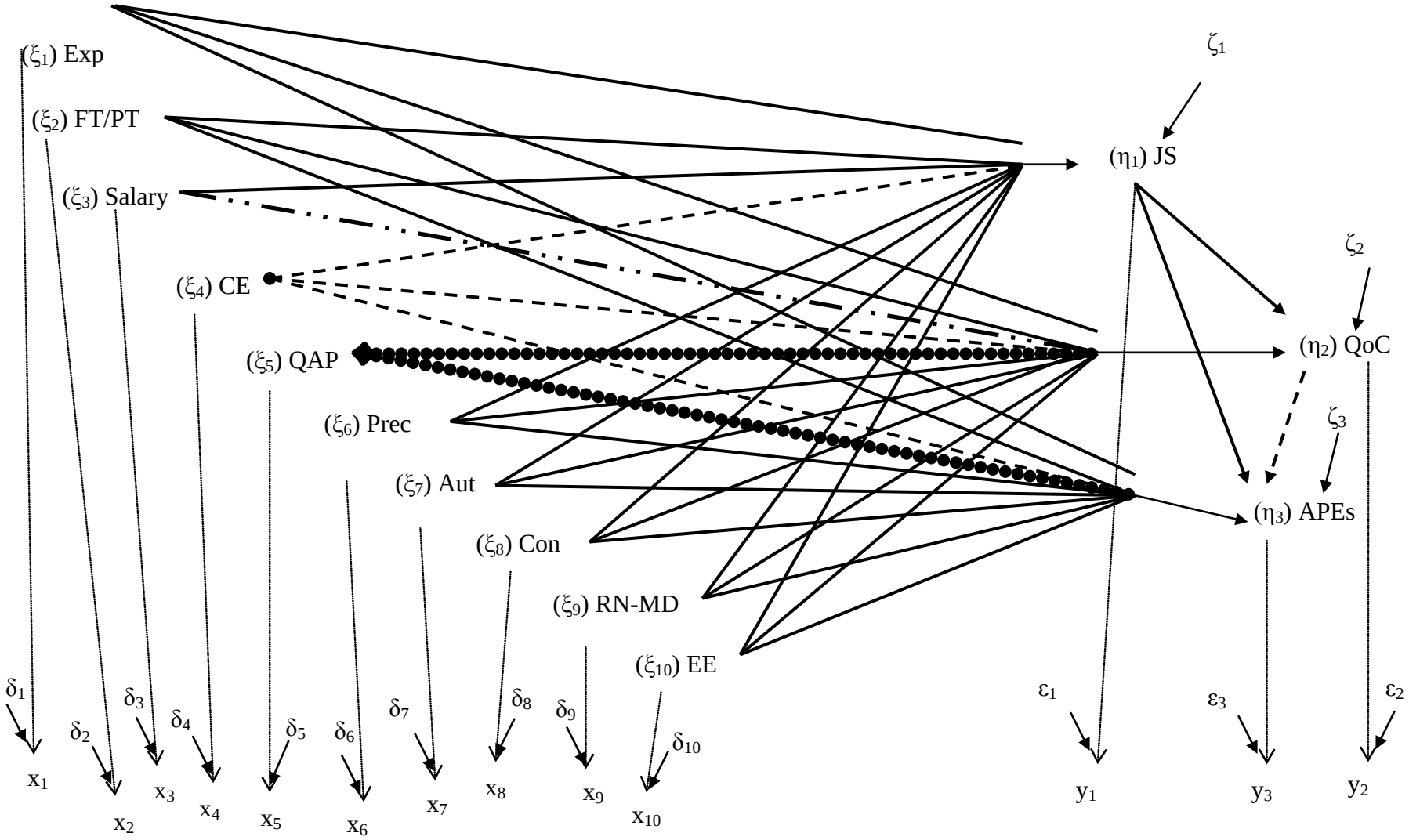


Figure 2 - The Measurement of the 4-group stacked model (all background variables covary)



ordinary lines (—————): different effects across groups

broken line (●- – – – -): equal effects in med & surg

dashed lines (◆●●●●●●●●●●●): equal effects in med & icu but <u>not</u> in surg or emergency

broken-dashed line (— · · — · · —): added in the final model after the modifications

JS: Job satisfaction
QOC: Quality of care
APEs: Adverse patient events
Exp: Experience

FT/PT: Full-time/Part-time
CE: Continuing education
QAP: Quality assurance program
Prec: Preceptorship

Aut: Autonomy
Con: Control over practice
RN-MD: Nurse-physician relationships
EE: Emotional exhaustion

Table 1 – Selected survey items for latent concepts

Latent concepts	Response scale	Survey item(s)	
Job satisfaction	1=very dissatisfied 4=very satisfied	"Overall, how satisfied are you with your present job"	
Quality of care	1=poor 4=excellent	"In general, how would you describe the quality of nursing care delivered to patients on your unit?"	
Adverse patient events	1=never 4=frequently - Recoded to: 0= none of these incidents occurred 1= each of these occurred at least once Score range: 0-3	"Over the past year, how often have each of the following incidents: a) patient received wrong medication or dose, b) nosocomial infections, c) patient falls with injuries occurred involving you or your patients?"	
Experience		"How many years have you worked on your current unit?"	
Full-time / Part-time	1=full time (≥35 hours per week) 2=part time (≤ 34 hours / week) Score range: 2-80	"In the past year, how many hours per week did you work, on average?"	
Salary	1=strongly disagree 4=strongly agree	"A satisfactory salary"	
Continuing education	1=strongly disagree 4=strongly agree	"Active staff development or continuing education programs for nurses"	
Quality assurance program	1=strongly disagree 4=strongly agree	"An active quality assurance program"	
Preceptorship	1=strongly disagree 4=strongly agree	"A preceptor program for newly hired RNs"	
Autonomy	1=strongly disagree 4=strongly agree Summed for a score range: 3-12	"Nursing controls its own practice", "Freedom to make important patient care and work decisions", "Not being placed in a position of having to do things that are against my nursing judgment"	
Control over practice	1=strongly disagree 4=strongly agree Summed for a score range: 5-20	"Adequate support services allow me to spend time with my patients", "Enough time and opportunity to discuss patient care problems with other nurses", "Enough registered nurses on staff to provide quality patient care", "A nurse manager or immediate supervisor who is a good manager and leader", "Working with nurses who are clinically competent"	
RN-MD relationships	1=strongly disagree 4=strongly agree Summed for a score range: 2-8	"Physicians and nurses have good working relationships", "A lot of team work between nurses and physicians"	
Emotional exhaustion*	0 = never 1 = a few times a year or less 2 = once a month or less 3 = a few times a month	4 = once a week 5 = a few times a week 6 = every day Summed for a score range: 0-54	For example: "I feel burned out from my work"

*These items represent one of the subscales of the Maslach Burnout Inventory, which is a copyrighted scale;
Maslach C, Jackson SE. Maslach Burnout Inventory. Palo Alto: Consulting Psychologists Press, 1986.

Table 2 – Four-group stacked model: Indicators, means, error variance, and indicator measurements

Indicators	Mean				% assessed as measurement error	Measurement error variance			
	Medical	Surgical	Intensive	Emergency		Medical	Surgical	Intensive	Emergency
Outcome variable									
Adverse patient events (APEs)	2.489	2.213	1.976	1.879	0.20	0.131	0.195	0.148	0.266
Intervening variables									
Quality of care (QOC)	3.195	3.210	3.444	3.014	0.10	0.042	0.037	0.038	0.054
Job satisfaction (JS)	2.791	2.837	2.974	2.701	0.05	0.034	0.032	0.036	0.043
Causal variables									
Experience (Exp)	5.929	6.516	6.687	7.896	0.01	0.249	0.304	0.291	0.396
Full-time/Part-time (FT/PT)	1.647	1.641	1.485	1.619	0.01	0.002	0.002	0.003	0.002
Salary	2.759	2.689	2.726	2.510	0.05	0.036	0.038	0.032	0.042
Continuing education (CE)	2.311	2.366	2.223	2.424	0.05	0.041	0.039	0.042	0.044
Quality assurance program (QAP)	2.527	2.566	2.538	2.497	0.05	0.030	0.029	0.030	0.032
Preceptorship (Prec)	2.561	2.610	2.972	2.731	0.05	0.048	0.048	0.039	0.046
Autonomy (Aut)	7.811	7.790	8.044	7.532	0.10	0.298	0.288	0.251	0.300
Control over practice (Con)	12.402	12.514	13.390	11.495	0.10	0.748	0.745	0.821	0.711
RN-MD relationships (RN-MD)	5.486	5.355	5.981	6.181	0.10	0.156	0.163	0.170	0.189
Emotional exhaustion (EE)	23.757	22.513	19.659	25.714	0.05	5.961	6.149	5.040	6.391

Table 3 – Four-group stacked model: Correlations*, variances**, and covariances*** matrices (pairwise)

	JS	QOC	APES	Exp	FT/PT	Salary	CE	QAP	Prec	Aut	Con	RN-MD	EE
Medical (N=544)													
JS	0.686	0.251	-0.030	0.000	0.052	0.233	0.279	0.225	0.190	0.358	0.411	0.251	-0.599
QOC	0.134	0.416	-0.101	0.054	0.055	0.035	0.147	0.218	0.136	0.289	0.393	0.248	-0.263
APES	-0.020	-0.052	0.657	-0.079	-0.034	0.055	-0.076	-0.029	-0.011	-0.125	-0.061	-0.136	0.152
Exp	0.001	0.175	-0.322	24.929	-0.033	-0.016	-0.062	0.046	-0.003	-0.099	-0.004	0.008	0.028
FT/PT	0.021	0.017	-0.013	-0.077	0.229	0.083	0.135	0.099	0.082	0.094	0.113	0.074	-0.191
Salary	0.163	0.019	0.038	-0.067	0.034	0.722	0.229	0.110	0.055	0.240	0.260	0.134	-0.236
CE	0.210	0.086	-0.056	-0.282	0.059	0.177	0.826	0.307	0.178	0.373	0.365	0.200	-0.280
QAP	0.143	0.109	-0.018	0.178	0.037	0.073	0.218	0.609	0.206	0.364	0.320	0.223	-0.221
Prec	0.154	0.086	-0.009	-0.015	0.038	0.045	0.158	0.157	0.956	0.189	0.167	0.133	-0.177
Aut	0.511	0.321	-0.171	-0.849	0.077	0.351	0.587	0.491	0.320	2.982	0.573	0.413	-0.446
Con	0.931	0.696	-0.135	-0.060	0.146	0.606	0.897	0.678	0.446	2.718	7.476	0.345	-0.490
RN-MD	0.259	0.201	-0.137	0.050	0.044	0.143	0.226	0.216	0.164	0.897	1.184	1.564	-0.239
EE	-5.403	-1.824	1.320	1.500	-1.002	-2.184	-2.767	-1.873	-1.874	-8.383	-14.612	-3.293	119.214
Surgical (N=588)													
JS	0.632	0.358	-0.106	0.059	0.017	0.219	0.190	0.217	0.164	0.373	0.475	0.246	-0.583
QOC	0.174	0.372	-0.163	0.047	0.060	0.107	0.102	0.200	0.129	0.289	0.401	0.221	-0.283
APES	-0.083	-0.097	0.975	-0.013	-0.099	0.017	-0.005	-0.132	-0.032	-0.060	-0.068	0.022	0.086
Exp	0.260	0.157	-0.070	30.352	-0.007	-0.005	0.031	0.048	0.110	0.013	0.009	0.063	-0.048
FT/PT	0.006	0.018	-0.047	-0.018	0.230	0.068	0.033	0.015	0.020	-0.012	0.059	-0.020	-0.171
Salary	0.152	0.057	0.014	-0.024	0.028	0.763	0.218	0.152	0.075	0.296	0.308	0.250	-0.265
CE	0.132	0.055	-0.004	0.149	0.014	0.168	0.778	0.266	0.283	0.339	0.276	0.165	-0.209
QAP	0.129	0.092	-0.098	0.199	0.005	0.100	0.177	0.573	0.232	0.336	0.367	0.232	-0.210
Prec	0.128	0.077	-0.031	0.595	0.010	0.065	0.245	0.172	0.966	0.233	0.262	0.206	-0.175
Aut	0.503	0.301	-0.100	0.117	-0.010	0.441	0.510	0.433	0.390	2.883	0.555	0.442	-0.355
Con	1.030	0.664	-0.183	0.139	0.077	0.734	0.661	0.757	0.704	2.557	7.450	0.370	-0.452
RN-MD	0.249	0.172	0.028	0.441	-0.012	0.279	0.186	0.224	0.258	0.963	1.277	1.625	-0.181
EE	-5.144	-1.902	0.941	-2.911	-0.908	-2.570	-2.023	-1.740	-1.899	-6.623	-13.617	-2.550	122.981

*Correlations: above the diagonal; **Variances: the diagonal; and ***Covariances: below the diagonal

Table 3 - Cont'd

	JS	QOC	APES	Exp	FT/PT	Salary	CE	QAP	Prec	Aut	Con	RN-MD	EE
Intensive Care (N=456)													
JS	0.715	0.388	-0.046	0.008	-0.122	0.161	0.196	0.173	0.141	0.335	0.379	0.355	-0.451
QOC	0.201	0.378	-0.174	0.009	-0.061	0.113	0.208	0.211	0.126	0.304	0.419	0.250	-0.308
APES	-0.033	-0.092	0.741	0.027	-0.043	-0.051	-0.107	0.004	-0.171	-0.173	-0.107	-0.126	0.110
Exp	0.035	0.029	0.121	29.099	0.216	0.014	-0.065	0.067	0.001	0.082	-0.072	-0.020	-0.100
FT/PT	-0.051	-0.019	-0.019	0.587	0.250	0.137	0.109	0.091	-0.029	-0.030	0.011	-0.042	-0.154
Salary	0.109	0.055	-0.035	0.060	0.055	0.641	0.107	0.063	0.093	0.228	0.277	0.153	-0.262
CE	0.152	0.117	-0.084	-0.321	0.050	0.078	0.839	0.316	0.194	0.351	0.401	0.193	-0.152
QAP	0.114	0.100	0.003	0.282	0.036	0.039	0.224	0.603	0.203	0.298	0.244	0.135	-0.123
Prec	0.106	0.069	-0.131	0.006	-0.013	0.066	0.158	0.140	0.789	0.244	0.229	0.220	-0.095
Aut	0.450	0.296	-0.232	0.692	-0.024	0.289	0.510	0.367	0.345	2.509	0.521	0.529	-0.340
Con	0.911	0.733	-0.262	-1.118	0.015	0.636	1.053	0.544	0.585	2.359	8.212	0.369	-0.384
RN-MD	0.392	0.200	-0.140	-0.143	-0.027	0.160	0.230	0.138	0.255	1.090	1.383	1.696	-0.241
EE	-3.853	-1.884	0.938	-5.444	-0.758	-2.127	-1.399	-0.954	-0.852	-5.445	-10.968	-3.139	100.803
Emergency (N=290)													
JS	0.857	0.408	-0.139	-0.107	0.039	0.121	0.363	0.278	0.159	0.391	0.456	0.315	-0.623
QOC	0.276	0.537	-0.230	-0.039	0.001	0.076	0.292	0.309	0.091	0.362	0.509	0.342	-0.320
APES	-0.147	-0.195	1.328	-0.146	-0.169	0.054	-0.040	-0.174	-0.014	-0.035	-0.090	-0.007	0.148
Exp	-0.624	-0.183	-1.032	39.582	0.071	0.064	-0.003	0.032	0.043	-0.083	-0.116	-0.185	-0.057
FT/PT	0.017	0.000	-0.095	0.218	0.237	0.086	0.100	0.100	-0.019	0.082	0.072	-0.124	-0.148
Salary	0.102	0.051	0.057	0.366	0.038	0.837	0.156	0.086	0.041	0.225	0.164	0.172	-0.196
CE	0.317	0.201	-0.044	-0.015	0.046	0.135	0.887	0.440	0.256	0.450	0.444	0.263	-0.346
QAP	0.207	0.183	-0.162	0.158	0.039	0.063	0.333	0.647	0.221	0.407	0.439	0.182	-0.258
Prec	0.141	0.064	-0.015	0.262	-0.009	0.036	0.232	0.169	0.920	0.366	0.289	0.149	-0.156
Aut	0.627	0.460	-0.068	-0.886	0.069	0.356	0.735	0.567	0.608	3.005	0.567	0.437	-0.338
Con	1.123	0.995	-0.274	-1.924	0.094	0.398	1.117	0.951	0.739	2.631	7.114	0.329	-0.424
RN-MD	0.401	0.344	-0.011	-1.604	-0.083	0.217	0.342	0.200	0.196	1.041	1.215	1.893	-0.184
EE	-6.581	-2.659	1.912	-4.048	-0.816	-2.013	-3.686	-2.357	-1.705	-6.538	-12.871	-2.876	127.829

JS: Job satisfaction
QOC: Quality of care
APEs: Adverse patient events
Exp: Experience
FT/PT: Full-time/Part-time
CE: Continuing education
QAP: Quality assurance program
Prec: Preceptorship
Aut: Autonomy
Con: Control over practice
RN-MD: RN-MD relationships
EE: Emotional exhaustion

Table 4 – Estimation results of testing the 4-group stacked model

Groups		Standardized Beta			Standardized Gamma									R^2 (%)
		JS	QOC	APEs	Exp	FT/PT	Salary	CE	QAP	Prec	Aut	Con	RN-MD	EE	
JS	Med	--	--	--	0.016	-0.085*	0.069	0.035	--	0.070	-0.004	0.101	0.073	-0.536**	43.6
	Srg	--	--	--	0.031	-0.082*	-0.012	0.035	--	-0.017	0.042	0.232**	0.052	-0.486**	45.1
	ICU	--	--	--	0.033	-0.193**	0.008	0.069	--	0.009	-0.028	0.146*	0.215**	-0.384**	35.7
	ER	--	--	--	-0.091*	-0.043	-0.050	0.073	--	-0.024	0.070	0.121	0.120*	-0.557**	52.4
QOC	Med	0.077	--	--	0.052	0.004	-0.108*	-0.049	0.082*	0.043	0.013	0.357**	0.106*	-0.023	23.6
	Surg	0.209**	--	--	0.030	0.046	--	-0.050	0.039	0.001	0.043	0.281**	0.050	-0.005	24.0
	ICU	0.214**	--	--	0.033	-0.073	--	0.013	0.086*	-0.010	-0.003	0.303**	0.033	-0.091	29.2
	ER	0.183*	--	--	0.069	-0.029	--	-0.009	0.077	-0.109	-0.012	0.432**	0.179*	0.004	39.5
APEs	Med	0.145*	-0.140**	--	-0.104*	0.001	--	-0.012	0.085*	0.021	-0.130	0.149	-0.115*	0.231**	9.2
	Surg	-0.091	-0.110**	--	-0.005	-0.104*	--	-0.010	-0.140*	0.003	-0.029	0.049	0.105	-0.008	6.0
	ICU	0.101	-0.202**	--	0.065	-0.070	--	-0.046	0.081*	-0.164**	-0.161	0.103	-0.027	0.065	10.8
	ER	-0.090	-0.296**	--	-0.136*	-0.178*	--	0.100	-0.178*	-0.023	0.110	0.091	0.017	0.039	17.4

*Significant effect >2.0 SE **Significant effect >3.0 SE

JS: Job satisfaction
QOC: Quality of care
APEs: Adverse patient events
Exp: Experience
FT/PT: Full-time/Part-time
CE: Continuing education
QAP: Quality assurance program
Prec: Preceptorship
Aut: Autonomy
Con: Control over practice
RN-MD: RN-MD relationships
EE: Emotional exhaustion