# The Relationships Between the Geriatric Practice Environment, Nursing Practice, and the Quality of Hospitalized Older Adults' Care

Adults' Care

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## Abstract

**Purpose**. To test the relationships between the geriatric practice environment, geriatric nursing practice, and the overall quality of care for older adults and their families as reported by nurses working in hospitals, while controlling for nurse and hospital characteristics.

**Design**. A cross-sectional tailored survey design was employed. A questionnaire was mailed to a randomly selected sample of nurses whose primary practice area was medicine, surgery, geriatrics, emergency, or critical care in acute care hospitals in Ontario, Canada.

**Methods**. Participants (n = 2005) working in 148 hospitals responded to validated measures of the geriatric practice environment, geriatric nursing practice, overall quality of care for older adults and their families, and nurse and hospital characteristics. The relationships were tested using structural equation modeling.

**Findings**. Controlling for nurse and hospital characteristics, the geriatric practice environment had a statistically significant positive relationship of large magnitude with both geriatric nursing practice ($\beta$= 0.52) and overall quality of care ($\beta$= 0.92); however, the indirect relationship between the geriatric practice environment and overall quality of care, mediated by geriatric nursing practice, was not significant ($\beta$ = -0.02). Final model fit was acceptable with the Root Mean Square Error of Approximation = 0.07, Comparative Fit Index = 0.93, and Tucker-Lewis Index = 0.87.

**Conclusions**. A strong geriatric practice environment positively and directly influences geriatric nursing practice and overall quality of care for older adults and their families but does not appear to influence overall quality of care indirectly through geriatric nursing practice.

**Clinical relevance**: The results can be used as the basis for promoting practice environments that support overall quality of care and geriatric nursing practice in acute care hospitals.

*Keywords:* Geriatrics, Nursing practice, Environment, Quality of care, Structure equation model

# The Relationships Between the Geriatric Practice Environment, Nursing Practice, and the Quality of Hospitalized Older Adults' Care

Adults aged 65 and older represent a small proportion of the population yet account for roughly half of the hospitalizations in Canada (Canadian Institute for Health Information, 2013). In addition to their acute illnesses or injuries, most (55-98%) older adults admitted to the hospital have two or more concurrent chronic conditions, which make them vulnerable to poor outcomes such as functional decline (National Quality Forum, 2012). Healthcare practices (e.g. bed rest) that restrict older adults' functioning contribute to functional decline and related complications in this patient population (Kresevic & Palmer, 2015). Because nurses are the largest group of healthcare providers (Virani, 2012), the influence that their practice environments and care have on older patients' outcomes has gained considerable attention.

Kim, Capezuti, Boltz, and Fairchild (2009) reported that nurses require particular environmental supports in order to care for older adults and their families. These supports comprise geriatric resources, interprofessional collaboration, and organizational value of older adults' care (Kim et al., 2009) and, together, constitute the geriatric practice environment (GPE). Two studies found the GPE to predict patient outcomes (Boltz et al., 2008; Kim et al., 2009); however, the mechanisms underlying this relationship remain unclear. Studies have proposed that the GPE influences older patients' outcomes indirectly through its effect on geriatric nursing practice, conceptualized as a patient-, family-, and function-centered care approach (Capezuti et al., 2013; Kim et al., 2009), however, the studies did not explicitly define and measure geriatric nursing practice or test its proposed mediating relationship.

Research that advances understanding of the mechanisms by which the GPE is associated with the overall quality of care for hospitalized older adults and their families is needed to help

decision-makers identify key areas for quality improvement. The purpose of this study was to test the relationships between the GPE, geriatric nursing practice, and overall quality of care for older adults and their families as reported by nurses working in hospitals, while controlling for nurse and hospital characteristics. The specific aims were to test both: 1) the direct relationship between the GPE and overall quality of care, and 2) the indirect relationship between the GPE and overall quality of care, mediated by geriatric nursing practice.

## Theoretical Framework and Supporting Evidence

The study was guided by a theoretical framework derived from the theory of organizational interdependence that delineates the direct and indirect relationships among the GPE, geriatric nursing practice, and overall quality of care. The theory proposes that the practice environment shapes nursing practice which, in turn, impacts patient outcomes (Aiken & Hage, 1968). In this study, the theory was applied to the geriatric nursing practice environment and care of older hospitalized adults and their families. Overall quality of care for older adults and their families, as perceived by nurses, represented the outcome. Consistent with the theory, the framework proposes that the GPE influences overall quality of care both directly and indirectly through its influence on geriatric nursing practice and identifies nurse and hospital characteristics as extraneous variables that may influence the GPE, geriatric nursing practice, and overall quality of care, as well as the relationships among them.

The GPE has three concepts: geriatric resources, interprofessional collaboration, and organizational value of older adults' care (Table 1), as previously validated (Boltz, et al., 2008; Kim, et al., 2009). Geriatric nursing practice comprises patient-, family-, and function-centered care as derived from a review of studies that described the nurse's role in acute geriatric care settings as providing and coordinating older adults' care to promote their functioning, using a

patient- and family-centered approach (Fox et al., 2012). Overall quality of care represents nurses' perceptions that the care older adults and their families receive at the hospital is effective in improving outcomes. Evidence supporting the conceptualized relationships, which we present next, was drawn from studies that included the same or related concepts of interest.

**GPE and overall quality of care.** In cross-sectional surveys, greater human and material resources, organizational value of older adults' care, and interprofessional collaboration (Boltz et al., 2008; Kim et al., 2009) all demonstrated positive relationships with nurses' perceived overall quality of care for older hospitalized patients. In a systematic review of 29 studies, stronger interprofessional collaboration was associated with better quality of care, including reduced falls and functional decline in older patients (Tsakitzidis et al., 2016).

**GPE and geriatric nursing practice.** Lack of human resources (e.g. nurses) has been identified in qualitative studies as contributing to nurses' inability to provide care that is patient- (Esmaeili, Cheraghi, & Salsali, 2014) and function-centered (Fox & Butler, 2016). In a systematic review of 5 trials examining interventions targeting team collaboration, Zwarenstein, Goldman, & Reeves (2009) concluded that interprofessional collaboration may improve nursing practice. Although we found no studies examining the relationship between organizational value of older adults' care and nursing practice, respect of, and value for clients are central to both patient- and family-centered care (Epstein & Street, 2011).

**Geriatric nursing practice and overall quality of care.** In a systematic review of 13 controlled trials, older hospitalized adults who received care that focused on optimizing physical, cognitive, and psychosocial functioning using a patient- and family-centered approach had better quality care, manifested by fewer losses in the ability to perform activities of daily living, fewer falls and episodes of delirium, and less nursing home admissions compared to those who

received usual care (Fox et al., 2012). In observational and quasi-experimental studies, older hospitalized adults who received care that maximized their physical activity had less physical and cognitive decline (Boltz, Chippendale, Resnick, & Galvin, 2015; Boltz, Resnick, Capezuti, Shabbat, & Secic, 2011) and their families were better prepared for caregiving (Boltz et al., 2015) than participants who received usual care.

**Nurse and hospital characteristics.** Prior research identified that nurses who gave more favourable reports of their GPE had less nursing experience and education (Capezuti et al., 2013) and worked in large, teaching hospitals (McKenzie, Blandford, Menec, Boltz, & Capezuti, 2011). Hospitals located in municipalities (i.e. cities, towns, villages and townships) with smaller populations have fewer resources and less access to geriatric specialists (Skinner & Hanlon, 2016). Nurses who reported better nursing practice, reflected in engaging families in care and coordinating care, were more educated (Coyne, Murphy, Costello, O'Neill, & Donnellan, 2013; Misto, 2014) and experienced (Misto, 2014). Nurses who gave higher overall quality of care ratings tended to be more educated, older in age, less experienced, and work in large (Boltz et al., 2008) teaching (Capezuti et al., 2013) hospitals

Taken together, prior studies support the relationships proposed between many of the individual concepts, but none have tested, simultaneously, the direct and indirect relationships among them. This study extends prior research by testing if geriatric nursing practice mediates the relationship between the GPE and overall quality of care for older adults and their families.

## Materials and Methods

### Design and Sample

In this cross-sectional study, we used Dillman's tailored survey design (Dillman, Smith, & Christian, 2014), which consisted of mailing, at one week intervals, a pre-notification letter

explaining the study, followed by the questionnaire and a postcard thanking responders and reminding non-responders to complete the questionnaire. Nurses who did not respond were sent up to two reminders and a replacement questionnaire two to four weeks later. The questionnaire containing measures of the concepts was mailed to a random sample of nurses working in acute care hospitals in Ontario, Canada. The sample was randomly selected from the list of nurses, kept by the College of Nurses of Ontario, who reported employment in the Ontario acute care hospital sector and a primary practice area of medicine, surgery, geriatrics, emergency, or critical care, and who provided consent to release their name and contact information for research purposes. The eligibility criteria and data collection procedures have been previously described (Fox et al., 2015).

The total sample size was calculated based on the goal of estimating the population parameters (quantifying the direct and indirect relationships among the concepts) using a structural equation model sample size calculator (Westland, 2012). A population of 24,102 nurses met the eligibility criteria. A minimum sample size of 1,794 was needed to estimate the population parameters based on two latent constructs (GPE and geriatric nursing practice), 14 manifest or observed variables (overall quality of care, 3 GPE variables, 3 geriatric nursing practice variables, and 7 extraneous variables), setting the power (1-β) at .90 and the significance level (α) at .01, and anticipating a small direct relationship (effect size = 0.10) between the two latent constructs (GPE and geriatric nursing practice).

**Measures**

*GPE*. GPE was operationalized in three concepts: geriatric resources, interprofessional collaboration, and organizational value of older adults' care (Table 1). Geriatric resources and organizational value of older adults' care were measured by the Resource Availability and

Institutional Values Regarding Older Adults and Staff Subscales, respectively (Boltz, Capezutti, Kim, Fairchild, & Secic, 2009). Interprofessional collaboration was measured by the Interdependence Subscale of the Modified Index of Interdisciplinary Collaboration (Bronstein, 2002). All three subscales demonstrated internal consistency reliability (Cronbach's $\alpha > .83$) and factorial validity (item loadings $\geq .30$) in prior research (Boltz et al., 2009; Bronstein, 2002; Kim et al., 2007).

*Geriatric nursing practice*. This concept was operationalized as nurses' appraisal of their care as patient-, family-, and function-centered. Patient-centered care was measured by the Patient-Centered Care Scale which has demonstrated internal consistency reliability (Cronbach's $\alpha = .88$) and factorial validity (item loadings > .30: Sidani, 2008; Sidani et al., 2006). Family-centered care was measured by the Family Nursing Practice Scale which has been found to be reliable (Cronbach's $\alpha = .86$ and test-retest intraclass correlation coefficients of .55 to .70; Simpson & Tarrant, 2006). Function-centered care was measured by the Functional Care Activities Scale that we developed for this study. The scale, which measures nurses' perceived level of provision and coordination of care that promotes patients' functioning, demonstrated reliability (Cronbach's $\alpha = .95$) and construct validity evidenced by a moderate correlation ($r = .50$, $p < .001$) with the Patient-Centered Care Scale.

*Overall quality of care*. This concept was operationalized as nurses' rating of the overall care that older adults and their families received at the hospitals as effective in improving outcomes. Overall quality of care was measured by the Aging-Sensitive Service Delivery Scale which solicits nurses' perceptions on the extent to which the care that older adults and families receive at the hospital is evidence-based, geriatric specific, individualized and continuous; the scale previously demonstrated good psychometric properties (Boltz et al., 2008).

*Extraneous variables* were measured by standard questions on nurses' age, highest level of education in nursing, years of nursing experience, and years worked as a nurse at the primary or main hospital in which they were employed. We also used standard questions assessing the name and location of nurses' primary hospital from which we derived variables on hospital teaching status (non-teaching vs teaching based on membership in the Council of Academic Hospitals of Ontario, which represents Ontario's 23 teaching and research hospitals (Council of Academic Hospitals of Ontario, 2018), hospital size (<100 beds vs ≥ 100 beds), and the population in 2006 of the municipality in which the hospital was located according to the 2006 Canadian Census.

**Data analysis**

Descriptive statistics were employed to describe the sample's average on all variables and to examine the variables for departures from normality and violation of the assumptions underlying the statistical modeling tests employed. The imputation of missing data was tested using the maximum estimation method MLMV option in Structural Equation Modeling (SEM) in Stata 13 software (StataCorp, 2013).

SEM was used to test the direct and indirect relationships between the GPE, geriatric nursing practice, and the overall quality of care for older adults and their families, while controlling for nurse and hospital characteristics. SEM was conducted in three sequential steps, as recommended by Hayduk (1987).

*The first step* tested the measurement model and focused on determining if the manifest variables were acceptable indicators of the latent constructs. Manifest variables were represented by the scores on the respective scales or subscales. The latent constructs and respective manifest variables were 1) the GPE: geriatric resources, interprofessional collaboration, and

organizational value of older adults' care; and 2) Geriatric nursing practice: patient-centered care, family-centered care, and function-centered care. Manifest variables that demonstrated good fit in reflecting the respective latent construct were included in the structural model (reflecting the proposed direct and indirect relationships among the study concepts) tested in the second step.

*The second step* involved testing the fit of the proposed structural model by examining the indirect relationships among GPE, geriatric nursing practice and overall quality of care, controlling for the extraneous variables. The latter was done by specifying direct paths linking each extraneous variable with 1) each manifest variable reflecting the two latent constructs and 2) overall quality of care.

*In the third step*, the structural model included all of the relationships tested in the second step as well as the direct relationship between GPE and overall quality of care. Support for the proposed relationships was determined by examining the statistical significance of the path coefficients among the two latent constructs and overall quality of care. An indirect relationship between GPE and overall quality of care, mediated by geriatric nursing practice, would be supported by: statistically significant path coefficients between GPE and geriatric nursing practice as well as between geriatric nursing practice and overall quality of care; a non-significant direct path coefficient between GPE and overall quality of care; and a significant Sobel test.

Path coefficients and model fit indices [(Root Mean Square Error of Approximation (RMSEA) < .08, Comparative Fit Index (CFI) and Tucker-Lewis Index (TLI) > .90] were evaluated to determine empirical support for the proposed direct and indirect relationships.

Cohen's benchmarks were used to interpret the magnitude of the standardized path coefficients $\beta$: < .10 (small); around .30 (medium); and $\geq$ .50 (large; Grissom & Kim, 2012).

## Results

### Sample Description

The sample included 2005 nurses from 148 hospitals where they had worked for a median of 11 years (range 1 to 44). Most were women (n = 1884; 94.9%), aged 46 years (SD = 11) with a college diploma (vs. university degree) as their highest level of education (n = 958; 49.2%) working full-time (n =1340; 68.4%) on the medical (n = 643; 32.9%), intensive, critical or coronary care (n = 432; 22%) and surgical (n = 402; 21%) units of large (n = 1704, 87%) non-teaching (n = 1345; 69%) hospitals located in municipalities with a median population of 204,668 (range 1,362 to 2,503,281).

### Test of Statistical Assumptions and Average Standing on Model Variables

No major departures from normality or violations of the assumptions underlying the statistical tests were identified. Only 7.9% of the cases had missing values. To address missing values, we tested the proposed relationships with and without missing data imputation; the results did not essentially differ, and so we report the results not using imputed data.

All multi-item measures had Cronbach's α coefficients $\geq$ .83. In terms of the GPE, nurses reported a slightly below mid-range level of geriatric resources ($M$ = 22.2, $SD$ = 6.3), an above mid-range level of interprofessional collaboration ($M$ = 4.0, $SD$ = 0.5), and a slightly above mid-range level of organizational value of older adults' care ($M$ = 34.4, $SD$ = 7.4). In terms of geriatric nursing practice, nurses identified moderate-to-high levels of patient- ($M$ = 3.9, $SD$ = 0.5), family- ($M$ = 38.1, $SD$ = 6.0), and function-centered ($M$ = 4.2, $SD$ = 0.6) care. They reported a slightly above average level of overall quality of care ($M$ = 34.4, $SD$ = 0.4).

**Testing the Proposed Relationships**

In the first step, the measurement model (Table 2) showed reasonable fit overall (RMSEA= 0.11, CFI = 0.93 and TLI = 0.87). The three manifest variables (geriatric resources, interprofessional collaboration, and organizational value of older adults' care) loaded on the GPE latent construct and were acceptable indicators of GPE (factor loadings ranged from 0.35 to 0.74; all $p < .001$). Similarly, the three manifest variables (patient-centered care, family-centered care, and function-centered care) were found to be appropriate indicators of geriatric nursing practice (factor loadings ranged from 0.59 to 0.85; all $p < .001$). Therefore, all manifest variables were maintained as indicators of their respective latent constructs in subsequent steps.

In the second step, controlling statistically for nurse and hospital characteristics, the structural model representing the indirect relationship between the GPE and overall quality of care, mediated by geriatric nursing practice, had poor overall fit (RMSEA = 0.14, the CFI = 0.69 and the TLI = 0.40), even though the path coefficients quantifying the direct relationships between the latent constructs were significant and in the anticipated direction. That is, the path coefficients for the direct relationship between GPE and geriatric nursing practice, $b = 0.08$, $z = 14.30$, $p < .001$, and the direct relationship between geriatric nursing practice and overall quality of care, $b = 10.57$, $z = 17.18$, $p < .001$ were positive and statistically significant.

In the third step, the structural model included all of the relationships tested in the second step as well as the direct relationship between GPE and overall quality of care. The fit indices were markedly improved (RMSEA = 0.07, CFI = 0.93 and TLI = 0.87), supporting the fit of the overall model to the data. The model (depicted in Figure 1) was accepted. In this final model, path coefficients of the extraneous variables that were statistically significant were all small in magnitude (all $\beta$'s < .12), demonstrating weak associations with the manifest variables (Table 3).

In terms of latent constructs, GPE was directly associated with overall quality of care, evidenced by a large and positive standardized path coefficient ($\beta = 0.92$). This finding supports the proposed direct relationship between GPE and overall quality of care. Geriatric nursing practice had a statistically significant, direct relationship of large magnitude with GPE ($\beta = 0.52$) but was not directly associated with overall quality of care ($\beta = -0.02$).

The indirect relationship between GPE and overall quality of care, mediated by geriatric nursing practice, was not supported as evidenced by: a non-statistically significant path coefficient between geriatric nursing practice and overall quality of care; a significant path coefficient between GPE and overall quality of care; and a non-significant Sobel test. The Sobel test indicated $a = 0.06$ (path coefficient for GPE → geriatric nursing practice), $se_a = 0.00$, $b = -0.33$ (path coefficient for geriatric nursing practice → overall quality of care), $se_b = 0.50$, Sobel statistic $t = -0.66$, $se_{ab} = 0.03$, $p = 0.51$.

## Discussion

To the best of our knowledge, this is the first study to test the relationships between the GPE, geriatric nursing practice and overall quality of care from the perspectives of a random sample of nurses. The results provide partial support for the relationships proposed in the theoretical framework, after controlling for nurse and hospital characteristics. Nurses who rated their GPE more positively tended to rate overall quality of care more highly. This result, which is consistent with prior studies (Boltz et al., 2008; Kim et al., 2009), suggests that a strong GPE, comprised of interprofessional collaboration, organizational value of older adults' care, and geriatric resources, is positively associated with overall quality of care for older adults and their families. However, the results also suggest that the relationship between the GPE and overall quality of care is not mediated by geriatric nursing practice. Rather, a strong GPE appears to

directly influence geriatric nursing practice, validating the importance of the environment to both nursing practice and overall quality of care. Hospital administrators can use the results as the basis for promoting environments in which older adults' care is highly valued and interprofessional collaboration surrounding such care is facilitated by geriatric resources. This development, in turn, is likely to improve nurses' provision of patient-, family-, and function-centered care. For example, items in the institutional value of older people's care subscale tapped into nurses' perceptions on the extent to which hospital administrators work with them in developing policies surrounding older adults' care. In a previous study, we proposed several strategies for administrators to use in working with nurses to improve older adults' care, such as soliciting nurses' input around operational decisions that influence older adults' care and supporting interprofessional collaboration by fostering nurses' participation in interprofessional team rounds (Fox & Butler, 2016).

In attempting to account for factors that may have contributed to the lack of a significant indirect relationship between GPE and overall quality of care, mediated by geriatric nursing practice, we propose the following four explanations. First, with standardized path coefficients of .52 and .92 respectively, the magnitude of the direct relationship that GPE had with geriatric nursing practice and overall quality of care were both large according to Cohen's guidelines. GPE is a noteworthy predictor of geriatric nursing practice and, in the presence of GPE, geriatric nursing practice does not add substantially more to the prediction of overall quality of care.

Second, the somewhat small variance in nurses' responses to the scales measuring geriatric nursing practice may have attenuated the size of the path coefficient, limiting detection of mediation. Nurses and other health professionals tend to give positive ratings of their practice

(Sidani et al., 2016). We previously found little variation in the positive ratings that health professionals' gave of their patient-centered care practices; however, patients' ratings of the extent to which the care they received was patient-centered were less positive and more varied (Sidani et al., 2016). Future studies that aim to advance understanding of the mechanisms by which the GPE influences overall quality of care for older hospitalized adults and families, may consider incorporating patients' and families' reports of nurses' geriatric nursing practice.

Third, treating overall quality of care as an outcome solely of nursing practice may have contributed to the lack of mediation. Because older adults present with complex health conditions, their hospital care requires the services of multiple health professionals. Thus, nurses are but one of many health professionals contributing to overall quality of care. Because our interest in this study was nursing practice, we did not assess other professionals' practices. However, Kline (2015) asserts that omitting additional mediating variables (e.g. other professionals' practices) reduces the power to detect statistically significant mediating variables (e.g. geriatric nursing practice) that were included in a model. Consequently, the indirect relationship between GPE and quality of care, mediated by geriatric nursing practice, may be detected when the practices of other health professionals are included as additional mediators – which remains a possibility for future research.

Our fourth explanation is that overall quality of care may not be a nurse-sensitive outcome, defined as an outcome that is largely attributed to nursing practice (Heslop & Lu, 2014). As such, a mediating effect of geriatric nursing practice may be detected in a model that includes patient outcomes that are more sensitive to nursing care than is overall quality of care. Future studies should examine if the GPE predicts nurse-sensitive outcomes,

such as functional status, self-care, iatrogenic complications (e.g. falls and pressure ulcers), and patient and family satisfaction that a patient-, family-, and function-centered approach to older adults' nursing care is anticipated to influence.

In terms of the measurement model, the results provide strong support for the contribution of geriatric resources, interprofessional collaboration, and organizational value of older adults' care to the GPE as well as strong support for the contribution of patient-, family-, and function-centered care to geriatric nursing practice. As far as we know, this is the only study to identify empirically that the three latter variables are valid indicators of geriatric nursing practice. Additional research is required to test if other approaches to care are more relevant indicators of geriatric nursing practice and serve as mediators of the relationship between GPE and overall quality of care.

The study results should be interpreted in the context of the cross-sectional nature of the design, from which causality cannot be inferred. The measures may have been subject to self-reporting bias. The study did not incorporate the perspectives of older adults, families or other health professionals, which may have promoted a better understanding of the GPE, geriatric nursing practice and overall quality of care. Data were collected from Canada, limiting generalization of the findings.

## Conclusions

This study provides partial support for relationships posed in a theoretical framework derived from the theory of organizational interdependence. A strong GPE appears to positively and directly influence geriatric nursing practice and the overall quality of care for older adults and their families. However, a strong GPE does not appear to influence overall quality of care indirectly through geriatric nursing practice. The results highlight the importance of cultivating

practice environments in which older adults' care is highly valued and interprofessional collaboration around this care is supported with geriatric resources. Future studies are needed to advance understanding of the mechanisms by which the GPE influences overall quality of care for older hospitalized adults and their families. Future researchers may consider including the practices of other health professionals as well as patients' and families' reports of nurses' geriatric nursing practice into the model, examining if the GPE predicts nurse-sensitive outcomes, and testing if other approaches to care are more relevant indicators of geriatric nursing practice and serve as mediators of the relationship between GPE and overall quality of care

## Clinical Resources

NICHE (Nurses Improving Care for Healthsystem Elders) website: http://www.nicheprogram.org

Hartford Institute for Geriatric Nursing website: https://hign.org/

Registered Nurses Association of Ontario Best Practice Guidelines for person and family centered care: http://rnao.ca/bpg/guidelines/person-and-family-centred-care

National Initiative on Care of the Elderly: http://www.nicenet.ca/

## References

Aiken, M., & Hage, J. (1968). Organizational interdependence and intraorganizational structure. *American Sociological Review, 33*(6), 912-930.

Boltz, M., Capezuti, E., Bowar-Ferres, S., Robert, N., Secic, M., Kim, H., . . . Fulmer, T. (2008). Hospital nurses' perception of the Geriatric Nurse Practice Environment. *Journal of Nursing Scholarship, 40*(3), 282-289.

Boltz, M., Capezuti, E., Kim, H., Fairchild, S., & Secic, M. (2009). Test retest reliability of the Geriatric Instituional Assessment Profile. *Clinical Nursing Research 18*(3), 242-252.

Boltz, M., Chippendale, T., Resnick, B., & Galvin, J. E. (2015). Testing family-centered, function-focused care in hospitalized persons with dementia. *Neurodegenerative Disease Management, 5*(3), 203-215.

Boltz, M., Resnick, B., Capezuti, E., Shabbat, N., & Secic, M. (2011). Function-focused care and changes in physical function in Chinese American and non-Chinese American hospitalized older adults. *Rehabilitation nursing: The official journal of the Association of Rehabilitation Nurses, 36*(6), 233-240.

Bronstein, L. R. (2002). Index of interdisciplinary collaboration. *Social Work Research, 26*(2), 113-126.

Canadian Institute for Health Information. (2013). Highlights of 2011-2012 inpatient hospitalizations and emergency department visits. Retrieved from: https://www.google.ca/url?sa=t&rct=j&q=&esrc=s&source=web&cd=2&cad=rja&uact=8&ved=0ahUKEwiFhJ69xe_QAhUI8WMKHT9yC5AQFggjMAE&url=https%3A%2F%2Fsecure.cihi.ca%2Ffree_products%2FDAD-NAC.

Capezuti, E., Boltz, M. P., Shuluk, J., Denysyk, L., Brouwer, J. P., Roberts, M., . . . Secic, M. (2013). Utilization of a Benchmarking Database to Inform NICHE Implementation. *Research in Gerontological Nursing, 6*(3), 198-208.

Council of Academic Hospitals of Ontario. (2018). About us. Retrieved from http://caho-hospitals.com/about-us/

Coyne, I., Murphy, M., Costello, T., O'Neill, C., & Donnellan, C. (2013). A Survey of Nurses' Practices and Perceptions of Family-Centered Care in Ireland. *Journal of Family Nursing, 19*(4), 469-488.

Dillman, D. A., Smith, J. D., & Christian, L. M. (2014). *Internet, Phone, Mail and Mixed-Mode Surveys: The Tailored Design Method* (4th ed.). Hoboken, New Jersey: John Wiley & Sons.

Epstein, R. M., & Street, R. L. (2011). The values and value of patient-centered care. *Annals of Family Medicine, 9*(2), 100-103.

Esmaeili, M., Cheraghi, M. A., & Salsali, A. (2014). Barriers to patient-centered care: A thematic analysis study. *International Journal of Nursing Knowledge, 25*(1), 2-8.

Fox, M. T. & Butler, J. I. (2016). Nurses' perspectives on how operational leaders influence function-focused care for hospitalized older people. *Journal of Nursing Management, 24*(8), 1119-1129.

Fox, M. T., Butler, J. I., Persaud, M., Tregunno, D., Sidani, S., & McCague, H. (2015). A multi-method study of the geriatric learning needs of acute care hospital nurses in Ontario, Canada. *Research in Nursing & Health, 39*(1), 66-76.

Fox, M. T., Persaud, M., Maimets, I., O'Brien, K., Brooks, D., Tregunno, D., & Schraa, E. (2012). Effectiveness of acute geriatric unit care using acute care for elders components:

A systematic review and meta-analysis. *Journal of the American Geriatrics Society, 60*(13), 2237-2245.

Grissom, R. J., & Kim, J. J. (2012). *Effect Sizes for Research: Univariate and Multivariate Applications* (2nd ed.). New York: Routledge.

Hayduk, L. A. (1987). *Structural Equation Modeling with LISREL: Essentials and Advances*. Baltimore: Johns Hopkins University Press.

Heslop, L., & Lu, S. (2014). Nursing-sensitive indicators: a concept analysis. *Journal of Advanced Nursing, 70*(11), 2469–2482. doi: http://doi.org/10.1111/jan.12503

Kim, H., Capezuti, E., Boltz, M., & Fairchild, S. (2009). The nursing practice environment and nurse-perceived quality of geriatric care in hospitals. *Western Journal of Nursing Research, 31*(4), 480-495.

Kim, H., Capezuti, E., Boltz, M., Fairchild, S., Fulmer, T., & M.Mezey. (2007). Factor structure of the Geriatric Care Environment Scale. *Nursing Research, 56*(5), 339-347.

Kline, R. B. (2015). *Principles and Practice of Structural Equation Modeling* (4th ed.). New York: The Guilford Press.

Kresevic, D. M., & Palmer, R. M. (2015). The acute care for elders unit. Malone, M. L, Capezuti, E.A, Palmer, R.M. (Eds.), *Acute Care for Elders: A Model for Interdisciplinary Care* (Vol. pp. 69-95). New York, NY: Humana, Springer.

McKenzie, J., Blandford, A., Menec, V., Boltz, M., & Capezuti, E. (2011). Hospital nurses' perceptions of the geriatric care environment in one Canadian health care region. *Journal of Nursing Scholarship, 43*(2), 181-187.

Misto, K. (2014). *The Relationship between Families' Perceptions and Nurses' Perceptions of Family Nursing Practice* [Doctoral Dissertation, The University of Rhode Island].

Retrieved from http://digitalcommons.uri.edu/cgi/viewcontent.cgi?article=1226&context=oa_diss

National Quality Forum. (2012). Multiple Chronic Conditions Framework (pp. 1-74). Washington.

Sidani, S. (2008). Effects of patient-centered care on patient outcomes: An evaluation. *Research and Theory for Nursing Practice: An International Journal, 22*(1), 24-37.

Sidani, S., Doran, D., Porter, H., LeFort, S., O'Brien-Pallas, L. L., Zahn, C., . . . Sarkissian, S. (2006). Processes of care: Comparison between nurse practitioners and physician residents in acute care. *Canadian Journal of Nursing Leadership, 19*(1), 44-60. doi: 10.12927/cjnl.2006.18050

Sidani, S., van Soeren, M., Hurlock-Chorostecki, C., Reeves, S., Fox, M., & Collins, L. (2016). Health professionals' and patients' perceptions of patient-centered care: A Comparison. *European Journal of Person Centered Healthcare, 4*(4), 2052-5648.

Simpson, P., & Tarrant, M. (2006). Development of the family nursing practice scale. *Journal of Family Nursing, 12*(4), 413-425.

Skinner, M., & Hanlon, N. (2016). *Ageing Resource Communities: New Frontiers of Rural Population Change, Community Development, and Voluntarism*. London: Routledge.

StataCorp. (2013). Stata Structural Equation Modeling Reference Manual: Release 13. (p. 583). Retrieved from http://www.stata.com/manuals13/sem.pdf

Tsakitzidis, G., Timmermans, O., Callewaert, N., Verhoeven, V., Lopez-Hartmann, M., Truijen, S., . . . Royen, P. V. (2016). Outcome indicators on interprofessional collaboration interventions for elderly. *International Journal of Integrated Care, 16*(2), 1-17.

Virani, T. (2012). *Interprofessional Collaborative Teams*. Ottawa: Canadian Health Services Research Foundation and Canadian Nurses Association.

Westland, J. C. (2012). Erratum to ‘‘Lower bounds on sample size in structural equation modeling.’’ *Electronic Commerce Research and Application 9*(6), 476-487.

Zwarenstein, M., Goldman, J., & Reeves, S. (2009). Interprofessional collaboration: Effects of practice-based interventions on professional practice and healthcare outcomes. *Cochrane Database of Systematic Reviews, Art. No.: CD000072*.

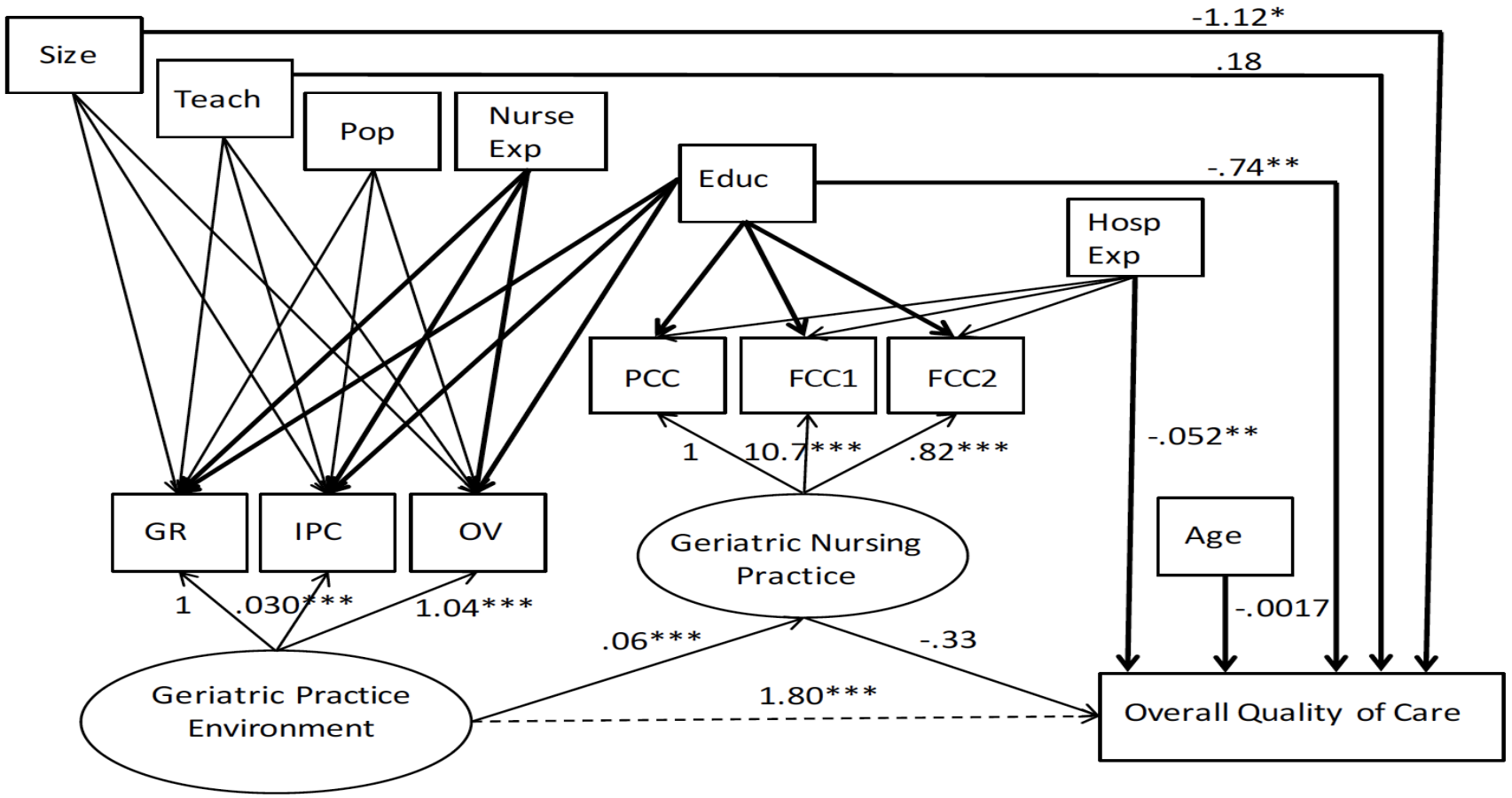


*Figure 1*. Final Structural Equation Model. Unstandardized path coefficients loading on GPE, GNP, and overall quality of care are displayed. Significance levels alpha .05, .01 and .001: * $p <$. 05, ** $p <$ .01, *** $p <$ .001. Size = hospital size; Teach = teaching hospital; Pop = population of the municipality of primary hospital (in millions); Educ = highest level of education in nursing; Age = age of nurse; Nurse Exp = years of nursing experience; Hosp Exp = years worked at primary hospital; GR = geriatric resources; OV = organizational value of older adults' care; IPC = interprofessional collaboration; PCC = patient-centered care; FCC1 = family-centered care; FCC2 = function-centered care.

Table 2.

*Measurement Model Coefficients of the Paths for Observed and Latent Variables (n = 2005; 1956 Complete Cases)*

| Variables | *b* | *β* | z | *p* |
|---|---|---|---|---|
| Geriatric resources | | | | |
| Geriatric practice environment | 1 | .57 | | |
| Intercept | 22.17 | 3.52 | 156.05 | .000*** |
| Interprofessional collaboration | | | | |
| Geriatric practice environment | .03 | .34 | 10.50 | .000*** |
| Intercept | 3.80 | 9.26 | 409.77 | .000*** |
| Organizational value of older adults' care | | | | |
| Geriatric practice environment | 1.03 | .73 | 16.90 | .000*** |
| Intercept | 24.42 | 4.77 | 211.14 | .000*** |
| Patient-centered care | | | | |
| Geriatric nursing practice† | 1 | .84 | | |
| Intercept | 3.88 | 7.54 | 333.87 | .000*** |
| Family-centered care | | | | |
| Geriatric nursing practice | 10.50 | .75 | 27.86 | .000*** |
| Intercept | 38.04 | 6.31 | 279.21 | .000*** |
| Function-centered care | | | | |
| Geriatric nursing practice | .82 | .58 | 23.50 | .000*** |
| Intercept | 4.16 | 6.80 | 301.03 | .000*** |

*Note.* $b$ = unstandardized coefficient; $z = z$ statistic corresponding to $b = 0$; $\beta$ = standardized coefficient; $p|$ = two-tailed probability. Latent variables = geriatric practice environment and geriatric nursing practice.
Significance level α .001; *** $p < .001$

Table 3.

*Final Full SEM Model: SEM Coefficients of the Paths for Observed and Latent Variables (n = 2005; 1847 Complete Cases)*

| Variables | *b* | *β* | *z* | *p* |
|---|---|---|---|---|
| Geriatric resources | | | | |
| Education | -.23 | -.02 | -1.09 | .27 |
| Nursing experience | .22 | .07 | 3.49 | .000** |
| Size | -1.11 | -.05 | -2.54 | .011* |
| Teaching | .97 | .07 | 3.00 | .003** |
| Population | -.19 | -.03 | -1.44 | .15 |
| GPE | 1.00 | .59 | | |
| Intercept | 22.15 | 3.53 | 41.59 | .000*** |
| Interprofessional collaboration | | | | |
| Education | .04 | .08 | 3.35 | .001** |
| Nursing experience | .02 | .11 | 5.06 | .000*** |
| Size | -.00 | -.00 | -.16 | .875 |
| Teaching | .01 | .01 | .51 | .612 |
| Population | -.02 | -.06 | -2.77 | .006** |
| GPE | .03 | .27 | 10.49 | .000*** |
| Intercept | 3.67 | 8.94 | 101.39 | .000*** |
| Organizational value of older adults' care | | | | |
| Education | -.30 | -.04 | 1.76 | .078 |

| | | | | |
|---|---|---|---|---|
| GERIATRIC NURSING PRACTICE | | | | |
| Nursing experience | -.16 | -.07 | -3.51 | .000*** |
| Size | -.75 | -.05 | -2.22 | .026* |
| Teaching | -.06 | -.00 | -.26 | .795 |
| Population | .41 | .07 | 4.39 | .000*** |
| GPE | 1.03 | .76 | 24.85 | .000*** |
| Intercept | 25.85 | 5.13 | 62.60 | .000*** |
| Patient-centered care | | | | |
| GNP | 1 | .84 | | |
| Education | -.02 | -.02 | -1.19 | .233 |
| Hospital experience | .00 | .00 | .37 | .711 |
| Intercept | 3.89 | 7.57 | 139.89 | .000*** |
| Family-centered care | | | | |
| GNP | 10.70 | .76 | 28.02 | .000*** |
| Education | .24 | .02 | 1.20 | .230 |
| Hospital experience | .01 | .02 | 1.17 | .244 |
| Intercept | 37.52 | 6.19 | 113.93 | .000*** |
| Function-centered care | | | | |
| GNP | .81 | .57 | 22.86 | .000*** |
| Education | -.10 | -.11 | -5.05 | .000*** |
| Hospital experience | .00 | .01 | .44 | .658 |
| Intercept | 4.24 | 6.93 | 127.55 | .000*** |
| GNP | | | | |
| GPE | .06 | .51 | 14.31 | .000*** |

| | | | | |
|---|---|---|---|---|
| Quality of care | | | | |
| GNP | -.32 | -.01 | -0.66 | .511 |
| Education | -.73 | -.07 | -2.94 | .003** |
| Age | -.00 | -.00 | -0.12 | .908 |
| Hospital experience | -.05 | -.07 | -3.33 | .001** |
| Size | 1.12 | -.05 | -2.34 | .019* |
| Teaching | .18 | .01 | 0.51 | .611 |
| GPE | 1.79 | .91 | 19.96 | .000*** |
| Intercept | 36.78 | 5.03 | 45.78 | .000*** |

*Note.* GPE = geriatric practice environment; GNP = geriatric nursing practice; $b$ = unstandardized path coefficient; $z$ = $z$ statistic corresponding to $b = 0$. $\beta$ = standardized path coefficient; $p$ = two-tailed probability. Latent variables = GPE and GNP.
Significance levels α .05, .01 and .001: * $p < .05$, ** $p < .01$, *** $p < .001$;