Published in final edited form as:

Oncol Nurs Forum. 2012 March 1; 39(2): 166–172. doi:10.1188/12.ONF.166-172.

Practice Environments of Nurses Employed in Ambulatory Oncology Settings: Measure Refinement

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Abstract

Purpose/Objectives—To examine the reliability and validity of modified items from the Practice Environment Scale of the Nursing Work Index (PES-NWI) for use in the understudied ambulatory oncology setting

Design—Cross-sectional mailed survey using a modified Dillman method.

Sample and Setting—Population-based statewide sample of oncology nurses who reported employment outside of hospital inpatient units.

Methods—After examining for non-response bias, confirmatory factor analysis using structural equation modeling and Cronbach coefficient alphas were employed to examine construct validity and internal consistency, respectively. After calculating revised subscale means for each nurse, we used t-tests to compare subscale means between nurses who reported their practice environment as favorable versus mixed or unfavorable.

Main Research Variables—Items were modified from the PES-NWI following focus groups, expert review, and cognitive interviewing. The final instrument included a reduced set of items used in the original subscales, plus one new scale with two items to measure the quality of medical assistant support.

Findings—Despite a response rate of 30.5 percent, no differences in demographic characteristics were observed between the analytic sample and non-responders. After reducing the number of items to 23, we achieved acceptable model fit with a comparative fit index of 0.95 and a root mean-square error of approximation of 0.057. All five existing PES-NWI subscales, plus the new medical assistant support subscale, were significantly higher for nurses who reported favorable practice environments, versus those who reported mixed or unfavorable environments.

Conclusions—A revised set of items that derive from the PES-NWI has acceptable reliability and validity to measure the quality of nursing practice environments in ambulatory oncology settings. Medical assistant support is a new contribution to the item pool.

Implications for Nursing—Further testing of this revised measure in diverse samples of nurses, including studies that correlate with patient outcomes, are necessary next steps.

The urgent need to improve quality of cancer care coincides with a looming shortage of health care providers to deliver said care. In 1999, the National Cancer Policy Board of the Institute of Medicine identified a “wide gulf” between the gold standard of cancer care and the quality of care delivered to many patients, and gaps in quality of care persist today (Hewitt & Simone, 1999). The Centers for Disease Control and Prevention and National Cancer Institute (NCI) estimate approximately 1.5 million new cases of invasive cancer in

2010 (Jemal, et al., 2009). The NCI estimates the number of patients living with cancer will increase by 50 percent between 2005 and 2020 (Yabroff, Lawrence, Clauser, Davis, & Brown, 2004). This explosive growth in cancer care demand is coupled with only a meager increase in the number of oncology health care providers. The American Society of Clinical Oncology predicts a shortage of 2,550 to 4,080 medical oncologists by 2020 (Association of American Medical Colleges, 2007). While not specific to oncology nursing, one leading nurse workforce research predicts a shortage of 500,000 registered nurses by 2025 (Buerhaus, Auerbach, & Staiger, 2009).

The gaps in both cancer care quality and the cancer workforce necessitate a remedy. In 2009, the Institute of Medicine convened a workshop to address these issues (Institute of Medicine, 2009). Workshop attendees endorsed two related strategies to mitigate the shortage of providers and the potential impact on quality of care. The first is to encourage oncology providers, including nursing, to postpone retirement. Strongly related to this recommendation is to create favorable environments to practice clinical care. A favorable environment for clinical practice, defined as the characteristics of a health care organization that support the highest functioning of nurses, is likely to reduce turnover and premature retirement (Lake, 2007).

Nursing practice environments have received increased attention as a mechanism to improve care quality. From a conceptual perspective, nursing practice environments are features of settings where nurses are employed that promote job satisfaction, quality of care, or patient safety (Lake, 2007). Organizational sociologists postulate that practice environments with professional, as opposed to bureaucratic orientations, are more likely to result in positive employee, customer, and/or organizational outcomes (Flood & Scott, 1987). Several studies have identified significant relationships between positive nursing practice environments and improved patient outcomes (Aiken, Smith, & Lake, 1994; Frieze, Lake, Aiken, Silber, & Sochalski, 2008; Van Bogaert, Clarke, Roelant, Muelemans, & Van de Heyning, 2010). An Institute of Medicine panel affirmed the necessity and feasibility of improving work environments to improve patient safety (Page, 2004). However no reliable and valid measures of this phenomenon exist for the ambulatory setting. Most of the reviewed studies occurred in the inpatient setting. Increased attention to measuring and improving the practice environments of ambulatory oncology settings is warranted, as the overwhelming majority of chemotherapy treatments occur outside of inpatient units. This paper reports on a study to examine the feasibility of a measure designed originally for the inpatient setting to measure the practice environment of nurses in ambulatory oncology settings.

Previous Studies

Since the 1980s, researchers have examined the practice environments of nurses in attempts to identify factors that contribute to high job retention, low turnover, high job satisfaction, and favorable patient outcomes. A review of prior studies in the field yielded 203 articles and seven multidimensional measures (Lake, 2007). Kramer and Hafner's (1989) seminal work developed scales to reflect the presence or absence of characteristics found in the original set of Magnet hospitals designated by the American Academy of Nursing Expert Panel (McClure, Poulin, Sovie, & Wandelt, 1983). The Nursing Work Index (NWI) consisted originally of 65 items. Aiken and Patrician's Nursing Work Index-Revised (NWI-R) (2000) has 55 items across three conceptually-based subscales. Lake's (2002) Practice Environment Scale of the Nursing Work Index (PES-NWI) has a total of 31 items across five empirically-derived subscales. Other investigators have used the NWI items to derive subscales through conceptually- or empirically-derived subscales (Choi, Bakken, Larson, Du, & Stone, 2004; Erickson, Duffy, Gibbons, Fitzmaurice, Ditomassi, & Jones, 2009; Erickson, et al., 2004; Estabrooks, et al., 2002). Investigators have used other instruments to

measure the nursing practice environment (Adams, Bond, & Arber, 1995; Moos & Insel, 1994; Nolan, Grant, Brown, & Nolan, 1998; Sims, Szilagyi, & Keller, 1976; Whitley & Putzier, 1994). However, Lake's (2007) review identified the PES-NWI and/or NWI-R scales as most useful to researchers studying nursing practice environments.

Challenges persist with nursing practice environment measurement, although both the NWI-R and the PES-NWI have documented convergent validity, discriminant validity, and reference scores in several populations. Cummings and colleagues compared three sets of scales derived from NWI items to measure nursing practice environments in 1998 survey data from 12,780 Canadian nurses (Cummings, Hayduk, & Estabrooks, 2006). Using structural equation modeling (SEM), the authors concluded these three measurement approaches failed model fit parameters routinely used in SEM, and argued for theory-driven measurement approaches. Critics point to the age of the items; the original NWI items date to the 1980s. A third concern is the specificity of the items to the inpatient setting.

Our interest in the organizational context where the majority of cancer care is delivered, coupled with the measurement challenges highlighted above, motivated our research team to explore the practice environments of nurses employed in ambulatory oncology settings. First, we conducted focus groups with nurses employed in these settings to generate potential areas of inquiry for empirical measurement, and to affirm or negate dimensions of the nursing practice environment previously studied in the inpatient context (Kamimura, Lee, Schneider, Crawford, and Frieze, In press). We used the dimensions from Lake's PES-NWI subscales: nurse participation in (practice) affairs; nursing foundations for quality of care; nurse manager ability, leadership, and support of nurses; staffing and resource adequacy, and; collegial nurse-physician relationships. Lake's dimensions were chosen given prior research findings with the measures in inpatient oncology nurses. Ambulatory oncology nurses generally affirmed the previously studied concepts, and strongly voiced the importance of favorable relationships with and support from medical assistants to deliver high-quality patient care and maintain job satisfaction (Kamimura, et al., In press). This work led our team to a series of revisions to the PES-NWI items to make them more suitable for the ambulatory oncology context.

The current manuscript reports our experience with administering an instrument to measure the practice environment of ambulatory oncology nurses, using a modified set of PES-NWI items. We provide descriptive statistics and measures of validity and reliability, with the intent of informing future research in measuring the nursing practice environment in ambulatory oncology settings.

Methods

Settings and Participants

We have reported previously our survey sampling procedures (Frieze, Lee, O'Brien, & Crawford, 2010). Briefly summarized, we conducted a survey of nurses licensed to practice in one state in the Southeast United States that collects both clinical specialty and practice setting of nurses with biannual licensure renewal. We identified 1,339 registered (RNs) and licensed practical nurses (LPNs) who identified their clinical specialty as oncology nursing and their practice setting as outside an inpatient unit. Survey activities began on April 19, 2010, and data collection ended on June 3, 2010.

Measures

The Practice Environment Scale of the Nursing Work Index (PES-NWI) served as the basis for our measure. Thirteen nurses in two focus groups completed the original PES-NWI, and provided suggestions for modifications using a semi-structured moderator guide (Kamimura,

et al., in press). We shared the modified measure with experts in both oncology and nursing systems research, who provided additional suggestions and improved face validity. To strengthen content validity, assure acceptability and assess comprehension of the revised items, we performed three one-hour cognitive interviews with nurses employed in ambulatory oncology settings (Knafl, et al., 2007; Willis, 2004). Our tested measure contained 53 items with the following instruction: “please rate the extent to which you agree that the characteristics below are present in your current job.” We scored each item on a five-point Likert scale, where 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree. The addition of a neutral scoring value departed from the original PES-NWI measure, which used a four-point Likert scale (strongly disagree, disagree, agree, and strongly agree) (Lake, 2002). Three of the 53 items that assessed collaborations between nurses and nurse practitioners, pharmacists, and physician assistants, had a sixth option, “does not apply,” based on feedback from focus group participants. A summary table of modifications and additions to the PES-NWI can be found in Appendix A. Finally, to assess the PES-NWI items against a global measure of practice environment, we asked respondents to “please describe the current practice environment for you as a nurse to delivery high-quality care.” Respondents could indicate a favorable, mixed, or an unfavorable nursing practice environment. This question was asked in a separate section from the PES-NWI items. A copy of the entire questionnaire is available from the author upon request.

Study Procedures

Our university granted human subjects approval for all study activities. We modified established survey methodology with slightly shorter mailing time frames (Dillman, Smyth, & Christian, 2009), and conducted a four-arm experiment comparing paper to Web questionnaire completion. The paper and Web questionnaires had identical content and order. We observed no significant response differences by mode of questionnaire completion (Frieese, et al., 2010). We contacted all nurses by first-class mail with 1) a pre-notification letter, 2) a primary mailing with \$2 cash incentive, a letter describing the study, and the paper questionnaire (or web invitation), and 3) a reminder letter. To non-responders, we sent 1) one additional cover letter with paper questionnaire/Web invitation followed by 2) one final reminder letter. Participants who completed the questionnaire via the Web entered data securely to a DatStat™ (Seattle, WA) platform. Study staff manually entered returned paper questionnaires into SPSS (Chicago, IL). Survey managers performed quality control audits on ten percent of the sample.

Data Analysis

After comparing the demographics of our analytic sample with those provided by the state board of nursing for the sampling frame, we calculated descriptive statistics of the revised PES-NWI items. We examined the correlation matrix of all items for evidence of acceptable intercorrelation (DeVellis, 2003). For multi-collinearity assessment, we used linear regression and calculated variance inflation factor and tolerance values. We employed two procedures to assess construct validity. First, we performed confirmatory factor analysis (CFA) using structural equation modeling (SEM) using EQS 6.1 software (Encino, CA). Our CFA assessed how a structural equation model using the existing PES-NWI subscales with the revised items fit the data of the analytic sample. We refined the SEM iteratively after examining diagnostic output, including the Lagrange Multiplier Test. Second, we compared the mean scores on the revised subscales for two groups: nurses who reported their practice environment as favorable on the one-item global measure, compared with those nurses who reported their practice environment as either mixed or unfavorable. We then calculated Cronbach's coefficient alpha scores to test the internal consistency of the subscales using the revised items, and used a cut point of 0.80 to indicate acceptable reliability (George & Mallery, 2003).

RESULTS

Using the American Association for Public Opinion Research (AAPOR) response rate calculation #2 (RR2), we obtained a 30.5 percent response rate (American Association for Public Opinion Research, 2009). Table 1 compares the demographics characteristics of our sample with available data on non-responders. We observed no statistically significant differences in characteristics between the analytic sample and non-responders.

Item Correlation and Multi-Collinearity

The highest correlation between variables was 0.71 (“A head nurse/supervisor who backs up the nursing staff in decision making, even if the conflict is with a physician” with “supervisory staff that is supportive of nurses”). Most item-to-item correlations were positive, and between 0.2 and 0.4 (The correlation and covariance matrices are available from the author by request). No tolerance values were below 0.24, and the highest VIF obtained was 4.50. Thus, we observed no evidence of multi-collinearity.

Structural Equation Modeling

Confirmatory factor analysis performed by structural equation modeling using the pre-existing PES-NWI subscales yielded statistics that indicated poor fit between the model and the underlying data structure. We then examined results from the multivariate Lagrange Multiplier Test to identify items that loaded on multiple factors. We reduced items iteratively after assessing the implications of the item’s omission on our conceptual framework. After reducing the number of items to 23, we achieved acceptable model fit, as evidenced by a comparative fit index of 0.95, and a root mean-square error of approximation (RMSEA) of 0.057 (95% confidence interval 0.049-0.064).

Revised Subscale Means Assessed against the Global Practice Environment Measure

To assess discriminant and criterion validity, we compared the PES-NWI subscale scores between nurses who reported their practice environment as favorable on a single-item question versus those nurses who reported their practice environment as mixed or unfavorable to delivery high-quality care (Table 2). Nurses who stated in a single-item question that their practice environment was favorable to deliver high-quality care had significantly higher scores on all PES-NWI subscales, compared with the entire sample, and the group of nurses who reported their environments as mixed or unfavorable.

Items and Subscale Reliability

Table 3 shows the mean and standard deviation of the revised PES-NWI items organized into the pre-existing subscales. With a 5-point Likert scale of 1= strongly disagree to 5 = strongly agree (with 3 = neutral), most items were appraised positively by respondents. The items with the highest scores were located in the Nursing Foundations for Quality of Care Subscale: “working with nurses who are clinically competent” (mean = 4.36), and “high standards of nursing care are expected by the administration” (mean = 4.24). The lowest scoring items were located in the Nurse Participation in Practice Affairs subscale: “many opportunities for advancement of nursing personnel” (mean = 2.81), “staff nurses are involved in the management decisions of the facility,” and “a chief nursing officer who is highly visible and accessible to staff” (mean = 2.92 for both items). The Medical Assistant Support subscale is a new addition with two items: medical assistants who help the care team (mean 3.58) and medical assistants contribute to smooth patient flow (mean 3.53). Cronbach alphas for the five subscales ranged from 0.80 to 0.90, reflecting acceptable internal consistency of the subscales.

Discussion

In a sample of nurses employed in ambulatory oncology settings, our study contributes to our limited understanding of perceived nursing practice environments. After focus groups, expert review, and cognitive interviews, we used data from a mailed survey to examine a modified item set from the only nursing practice environment measure endorsed by the National Quality Forum as a nursing-sensitive indicator of performance (National Quality Forum, 2011). Our findings have important implications for future research efforts in this area.

When evaluating a measure, researchers must examine the measure from several dimensions, including reliability and validity (DeVellis, 2003). The Cronbach alpha statistics computed for the subscales indicate acceptable internal consistency or homogeneity of items within each scale. This is impressive given the reduced number of items in several scales. One important implication is that highly-reliable subscales have lower error and thus higher statistical power. Also, we are more confident that subscale items measure the true latent constructs, in this case, the conceptual dimensions of the PES-NWI. Further, we are encouraged that we do not detect multi-collinearity, which can hamper subsequent modeling efforts.

Three aspects of validity are especially important in scale development and refinement: content, construct, and criterion validity (DeVellis, 2003). To address content validity, we revised our items iteratively, employed focus groups with a diverse sample of ambulatory oncology nurses, conducted expert review by clinicians, managers, and researchers, and finally performed cognitive interviews to enhance item clarity.

Construct validity is supported by our confirmatory analysis using SEM. These results suggest the established PES-NWI subscales required minor modifications to fit the sample's data structure. There are three important considerations for these findings. First, we conducted our analyses on 293 subjects, violating the generally-accepted target of 5-10 respondents per item. Second, the items removed that resulted in improved model fit may reflect characteristics observed less frequently in the ambulatory oncology setting. These items included professional development programs, such as preceptorships for newly-hired nurses, on-site continuing education offerings, and career development/clinical ladder programs. While inpatient settings routinely offer these programs, ambulatory settings may provide other opportunities, or rely on externally-funded programs (i.e., continuing education conferences). However, reconsideration of our focus group data did not identify other professional development features to include.

Third, in our review of item theory, we recognized the underlying PES-NWI items are more appropriately considered formative indicators, as opposed to reflective indicators (Bollen & Lennox, 1991; Diamantopoulos & Siguaw, 2006; Diamantopoulos & Winklhofer, 2001). Reflective indicators are items that are manifestations of the underlying concept. Changes in formative indicators change the value of the latent variable; reflective indicators behave in the opposite direction. While the problem of formative indicators was identified some time ago, it is rarely discussed by researchers (Bollen & Lennox, 1991). Formative indicators do not perform well in classic psychometric or structural equation modeling approaches (Diamantopoulos & Siguaw, 2006). One approach is to include both formative and reflective indicators in future measures, and to incorporate both in structural equation models. Future research strategies should include additional item development with reflective indicators. Another strategy is to augment questionnaires with existing measures for important, yet omitted concepts, such as safety orientation (Vogus & Sutcliffe, 2010) or teamwork (Kalisch & Lee, 2010).

Criterion validity is best assessed by comparing the candidate measure with a gold standard measure. In this case, no gold standard measure of ambulatory oncology nursing practice environment exists. Our next best approach was to consider a single-item, global measure that best captures the theoretical construct: assessment of the favorability of the practice environment for nurses to delivery high-quality patient care. This assessment yielded results in the hypothesized direction: nurses who reported their practice environments as favorable had significantly higher scores on all PES-NWI subscales. Nurses who reported mixed or unfavorable environments had significantly lower PES-NWI subscale scores. In our study, the validity is concurrent, as opposed to predictive. We cannot comment on the ability of this measure to predict future assessments or outcomes.

Our work also identified and validated additional considerations for measuring the practice environments of ambulatory oncology nurses. A subscale with two new items emerged entitled Medical Assistant Support. This is consistent with our previously published framework based on focus groups with ambulatory oncology nurses. These nurses uniformly reported their relationships with medical assistants as critical to high-quality patient care (Kamimura, et al., In press). The quality of nursing-medical assistant relationships and the association to outcomes has yet to be studied with vigor in ambulatory oncology settings.

Study Limitations

We have identified two study limitations that merit further discussion. First, our response rate, while modest, is within the range of published response rates for nurses. We employed several principles empirically demonstrated to increase response rates (e.g., introductory letters, upfront monetary incentives, color printing, and repeated mailings) (Dillman, et al., 2009). However, we observe no significant differences in demographic characteristics between responders and non-responders, minimizing the risk of response bias (Groves, 2002). Nurses in our sampling frame may not practice in our primary area of interest, and did not complete the survey. Continued attempts to encourage nurses to respond to surveys, coupled with formal non-response assessments, will strengthen survey research with nurses. Second, while we conducted a large, statewide survey, our findings may have limited generalizability to other geographic areas. We present these limitations alongside a report using a substantial number of oncology nurses whose work setting has not been studied previously. To our knowledge, this is first study to study practice environments with an empirical approach that is exclusively focused on the ambulatory setting.

Conclusions and Implications

A revised and reduced set of PES-NWI items to measure the practice environment of ambulatory oncology nurses demonstrates both reliability and validity. We demonstrate strong internal consistency, construct validity, and favorable criterion validity in a reduced set of PES-NWI items, coupled with the addition of items to capture the important contributions of medical assistants to high-quality care. Moving forward, augmentation of these items with stand-alone scales for important additional concepts is an important strategy for measuring practice environments in this understudied setting.

Acknowledgments

The author thanks Jose A. Bauermeister, PhD, MPH, for methodological consultation, and Scott D. Crawford and Sara O'Brien for their assistance with survey execution.

Funding: This research was supported by a Pathway to Independence Award from the National Institute of Nursing Research, National Institute of Health, R00 NR10750, and through the University of Michigan's Cancer Center Support Grant (5 P30 CA46592).

APPENDIX A

Modifications to the Practice Environment Scale of the Nursing Work Index (PES-NWI) for Ambulatory Oncology Settings

Historic PES-NWI Subscale	Item Text in Current Survey	Modification
Staffing and Resource Adequacy	The help from non-nursing employees allows me to spend time with my patients	1. Was “adequate support services allow me to spend time with my patients.” Edited after focus group input. 2. Deleted after SEM.
	Enough time and opportunity to discuss patient care problems with other nurses	Deleted after SEM.
	Enough staff to get the work done	
	Enough registered nurses to provide quality patient care	
Nursing Foundations for Quality of Care	Patient care assignments foster continuity of care, ie., the same nurse cares for the patient from one visit to the next	1. Was “from one day to the next.” 2. Deleted after SEM.
	Active in-service/continuing education programs for nurses	Deleted after SEM.
	A preceptor program for newly hired nurses	1. Was “newly hired RNs,” as LPNs included in sample. 2. Deleted after SEM.
	An active quality assurance/improvement program	1. Added improvement after focus group input. 2. Deleted after SEM.
	Use of nursing diagnoses	Deleted after focus group input and expert review.
	Written, up to date nursing care plans for all patients	Deleted after focus group input and expert review.
	Nursing care is based on a patient-centered approach.	Was “nursing care is based on a nursing, rather than a medical model.” Edited after focus group input.
	Working with nurses who are clinically competent	
	High standards of nursing care are expected by the administration	
	A clear philosophy of nursing that pervades the patient care environment	
Nurse Participation in Practice Affairs Subscale title edited to Practice	Nursing administrators consult with staff on daily problems and procedures	Deleted after SEM.
	Career development/clinical ladder opportunity	Deleted after SEM.
	A chief nursing officer equal in power and authority	Was “top level hospital executives.” Edited

Historic PES-NWI Subscale	Item Text in Current Survey	Modification
Affairs (was Hospital Affairs)	to other top level executives	after expert review.
	Nurses have the opportunity to serve on committees	Was "Staff nurses have the opportunity to serve on hospital and nursing department committees." Edited after focus group input.
	Staff nurses are involved in the management decisions of the facility	Was "staff nurses are involved in the internal governance of the hospital." Edited after focus group input.
	A chief nursing officer who is highly visible and accessible to staff	Was "director of nursing." Edited after expert review.
	An administration that listens to and responds to employee concerns	Changed who to that after expert review.
	Opportunity for staff nurses to participate in policy decisions	
Nurse Manager Leadership, Ability, and Support of Nurses	Many opportunities for the advancement of nursing personnel	
	A supervisory staff that is supportive of nurses	
	A head nurse/supervisor who backs up the nursing staff in decision making, even if the conflict is with a physician	
	Praise and recognition for a job well done A head nurse who is a good manager and leader Supervisors use mistakes as learning opportunities, not criticism	
Collegial Nurse-Physician Relations	A lot of team work between nurses and physicians	Was "doctors." Edited after focus group input.
	Physicians and nurses have good working relationships	Added "working" after focus group input.
	Collaboration (joint practice) between nurses and physicians	Was "functional collaboration." Changed after cognitive interviews.
New Subscale	Item Text	Action
Medical Assistant Support	Medical assistants who help the care team	Added after focus group input.
	Medical assistants contribute to smooth patient flow	Added after focus group input.

Note. SEM refers to Structural Equation Modeling; RN = registered nurse; LPN = Licensed Practice Nurse

The following 25 items were included in the survey, but excluded from analysis after poor psychometric performance:

1. Nursing certification is highly valued and rewarded
2. Lead or charge nurses recognize busy times and give assistance as necessary
3. The facility gives funding for nurses to attend conferences

4. Up-to-date, evidence-based policies and procedures are in place
5. A strong patient education program
6. The facility does not tolerate bullying behavior from one employee to another
7. Appropriate space for clinicians to have sensitive discussions with patients and families
8. Daily patient assignments take patient acuity and treatment complexity into account
9. Workloads are fairly distributed across nurses
10. A patient scheduling system that distributes patients based on complexity and time of treatment
11. A reliable system for patients and families to communicate with staff about changes to the patient's condition
12. Supportive care (such as anti-emetics, neutropenia, anemia, hydration) is protocol driven
13. Guidelines are in place for the management of adverse events during chemotherapy infusion
14. Senior nurses are available and accessible to ask questions or obtain advice
15. The opportunity to develop clinical expertise with a specific patient population
16. When patient care needs increase, other nurses are able to assist me
17. The facility is focused on improving the quality of care outcomes for patients
18. Clinical research is highly valued in the facility
19. Strong collaboration between nurses and nurse practitioners
20. Strong collaboration between nurses and nurse practitioners
21. Pharmacists (whether on- or off- site) are competent and responsive
22. Pharmacists (whether on- or off- site) are competent and responsive
23. Physician assistants and nurses work well together
24. Physician assistants and nurses work well together
25. The work environment is pleasant, attractive, and comfortable

References

- Adams A, Bond S, Arber S. Development and validation of scales to measure organisational features of acute hospital wards. *International Journal of Nursing Studies*. 1995; 32(6):612–627. [PubMed: 8926161]
- Aiken LH, Patrician PA. Measuring organizational traits of hospitals: the Revised Nursing Work Index. *Nursing Research*. 2000; 49(3):146–153. [PubMed: 10882319]
- Aiken LH, Smith HL, Lake ET. Lower Medicare mortality among a set of hospitals known for good nursing care. *Medical Care*. 1994; 32(8):771–787. [PubMed: 8057694]
- American Association for Public Opinion Research. Standard definitions: Final disposition of case codes and outcome rates for surveys. 6th edition. 2009. Retrieved December 10, 2010, from http://www.aapor.org/Standard_Definitions1.htm
- Association of American Medical Colleges. Forecasting the supply of and demand for oncologists: A report to the American Society of Clinical Oncology from the AAMC Center for Workforce Studies. 2007. Retrieved December 19, 2010, from

<http://www.asco.org/ASCO/Downloads/Cancer%20Research/Oncology%20Workforce%20Report%20FINAL.pdf>

- Bogen, K. The effect of questionnaire length on response rates: A review of the literature. 1996. Retrieved December 20, 2010, from <http://www.census.gov/srd/papers/pdf/kb9601.pdf>
- Bollen K, Lennox R. Convention wisdom on measurement: A structural equation perspective. *Psychological Bulletin*. 1991; 110(2):305–314.
- Buerhaus PI, Auerbach DI, Staiger DO. The recent surge in nurse employment: causes and implications. *Health Affairs*. 2009; 28(4):w657–668. doi: 10.1377/hlthaff.28.4.w657. [PubMed: 19525286]
- Centers for Disease Control and Prevention. National ambulatory medical care survey, 2005. 2008. from <http://www.cdc.gov/nchs/data/ad/ad387.pdf>
- Choi J, Bakken S, Larson E, Du Y, Stone PW. Perceived nursing work environment of critical care nurses. *Nursing Research*. 2004; 53(6):370–378. [PubMed: 15586133]
- Cummings GG, Hayduk L, Estabrooks CA. Is the Nursing Work Index measuring up? Moving beyond estimating reliability to testing validity. *Nursing Research*. 2006; 55(2):82–93. [PubMed: 16601620]
- DeVellis, RF. Scale development: Theory and applications. Sage; Thousand Oaks, CA: 2003.
- Diamantopoulos A, Siguaw JA. Formative versus reflective indicators in organizational measure development: A comparison and empirical illustration. *British Journal of Management*. 2006; 17(4):263–282.
- Diamantopoulos A, Winklhofer HM. Index construction with formative indicators: An alternative to scale development. *Journal of Marketing Research*. 2001; 38(2):269–277.
- Dillman, DA.; Smyth, J.; Christian, LM. Internet, Mail, and Mixed-Mode Surveys: The Tailored Design Method. 3rd ed.. John Wiley Co.; Hoboken, NJ: 2009.
- Erickson JI, Duffy ME, Ditomassi M, Jones D. Psychometric evaluation of the Revised Professional Practice Environment (RPPE) scale. *The Journal of Nursing Administration*. 2009; 39(5):236–243. doi: 10.1097/NNA.0b013e3181a23d14. [PubMed: 19423989]
- Erickson JI, Duffy ME, Gibbons MP, Fitzmaurice J, Ditomassi M, Jones D. Development and psychometric evaluation of the Professional Practice Environment (PPE) scale. *Journal of Nursing Scholarship*. 2004; 36(3):279–285. [PubMed: 15495499]
- Estabrooks CA, Tourangeau AE, Humphrey CK, Hesketh KL, Giovannetti P, Thomson D, Shamian J. Measuring the hospital practice environment: a Canadian context. *Research in Nursing & Health*. 2002; 25(4):256–268. doi: 10.1002/nur.10043. [PubMed: 12124720]
- Flood, AB.; Scott, WR. Hospital structure and performance. Johns Hopkins University Press; Baltimore, MD: 1987.
- Frieze CR, Lake ET, Aiken LH, Silber JH, Sochalski J. Hospital nurse practice environments and outcomes for surgical oncology patients. *Health Services Research*. 2008; 43(4):1145–1163. doi: 10.1111/j.1475-6773.2007.00825.x. [PubMed: 18248404]
- Frieze CR, Lee CS, O'Brien S, Crawford SD. Multi-mode and method experiment in a study of nurses. *Survey Practice*. 2010 Retrieved from <http://surveypractice.org/2010/10/27/multi-mode-nurses-survey/>.
- George, D.; Mallery, P. SPSS for Windows step by step: A simple guide and reference. 11.0 update. 4th ed.. Allyn and Bacon; Boston: 2003.
- Groves, RM. Survey nonresponse. Wiley; New York, NY: 2002.
- Hewitt, M.; Simone, JV., editors. Ensuring quality cancer care. National Cancer Policy Board, Institute of Medicine; Washington DC: 1999.
- Institute of Medicine. Ensuring Quality Cancer Care through the Oncology Workforce: Sustaining Care in the 21st Century. National Academies Press; Washington DC: 2009.
- Jemal A, Siegel R, Ward E, Hao Y, Xu J, Thun MJ. Cancer statistics, 2009. *CA: Cancer Journal for Clinicians*. 2009; 59(4):225–249. doi: caac.20006 [pii] 10.3322/caac.20006.
- Kalisch BJ, Lee KH. The impact of teamwork on missed nursing care. *Nursing Outlook*. 2010; 58(5): 233–241. doi: S0029-6554(10)00266-6 [pii] 10.1016/j.outlook.2010.06.004. [PubMed: 20934078]

- Kamimura A, Schneider K, Lee CS, Crawford SD, Frieze CR. Practice environments of nurses in ambulatory oncology settings: A thematic analysis. *Cancer Nursing*. In press.
- Knafl K, Deatrick J, Gallo A, Holcombe G, Bakitas M, Dixon J, Grey M. The analysis and interpretation of cognitive interviews for instrument development. *Research in Nursing & Health*. 2007; 30(2):224–234. doi: 10.1002/nur.20195. [PubMed: 17380524]
- Kramer M, Hafner LP. Shared values: impact on staff nurse job satisfaction and perceived productivity. *Nursing Research*. 1989; 38(3):172–177. [PubMed: 2717441]
- Lake ET. Development of the practice environment scale of the Nursing Work Index. *Research in Nursing & Health*. 2002; 25(3):176–188. doi: 10.1002/nur.10032. [PubMed: 12015780]
- Lake ET. The nursing practice environment: measurement and evidence. *Medical Care Research and Review*. 2007; 64(2 Suppl):104S–122S. doi: 10.1177/1077558707299253. [PubMed: 17406014]
- McClure, ML.; Poulin, MA.; Sovie, MD.; Wandelt, MA. Magnet hospitals: Attraction and retention of professional nurses. American Academy of Nursing; Kansas City, MO: 1983.
- Moos, RH.; Insel, PM. A social climate scale: Work environment scale manual. 3 ed.. Consulting Psychologists Press, Inc.; Mountain View, CA: 1994.
- National Quality Forum. Nursing-sensitive care: Initial measures. 2011. Retrieved March 9, 2011, from http://qualityforum.org/Projects/n-r/Nursing-Sensitive_Care_Initial_Measures/Nursing_Sensitive_Care_Initial_Measures.aspx
- Nolan M, Grant G, Brown J, Nolan J. Assessing nurses' work environment: old dilemmas, new solutions. *Clinical Effectiveness in Nursing*. 1998; 2(3):145–154. doi: 10.1016/s1361-9004(98)80011-3.
- Page, A., editor. Keeping patients safe: Transforming the work environment of nurses. National Academy Press; Washington DC: 2004.
- Sims HP, Szilagyi AD, Keller RT. The measurement of job characteristics. *Academy of Management Journal*. 1976; 19(2):195–212. [PubMed: 1029346]
- Van Bogaert P, Clarke S, Roelant E, Meulemans H, Van de Heyning P. Impacts of unit-level nurse practice environment and burnout on nurse-reported outcomes: a multilevel modelling approach. *Journal of Clinical Nursing*. 2010; 19(11-12):1664–1674. doi: 10.1111/j.1365-2702.2009.03128.x. [PubMed: 20579204]
- Vogus TJ, Sutcliffe KM. The Safety Organizing Scale: development and validation of a behavioral measure of safety culture in hospital nursing units. *Medical Care*. 2007; 45(1):46–54. doi: 10.1097/01.mlr.0000244635.61178.7a. [PubMed: 17279020]
- Whitley MP, Putzier DJ. Measuring nurses' satisfaction with the quality of their work and work environment. *Journal of Nursing Care Quality*. 1994; 8(3):43–51. [PubMed: 8018972]
- Willis, GB. Cognitive interviewing: A tool for improving questionnaire design. Sage; Thousand Oaks: 2004.
- Yabroff KR, Lawrence WF, Clauser S, Davis WW, Brown ML. Burden of illness in cancer survivors: findings from a population-based national sample. *Journal of the National Cancer Institute*. 2004; 96(17):1322–1330. doi: 10.1093/jnci/djh255. [PubMed: 15339970]

Table 1

Demographic Characteristics of the Analytic Sample and of Non-Responders

	Analytic Sample (n=292)	Non-Responders in Sampling Frame (n=910)	<i>p</i>
	n (%)		
Employed full-time	249 (84.9)	810 (89.0)	.09
Employed part-time	43 (14.7)	100 (11.0)	
White	265 (90.8)	829 (91.1)	.59
Non-White	27 (9.2)	81 (8.9)	
Female	283 (96.9)	877 (96.4)	.32
Male	6 (2.1)	29 (3.2)	
Missing Gender	<5 (<1.0)	<5 (<1.0)	
Hospital Outpatient	167 (57.2)	505 (55.5)	.11
Physician Practice	99 (33.9)	286 (31.4)	
Other Practice Setting	26 (8.9)	119 (13.1)	
Diploma Degree	43 (14.7)	134 (14.7)	.45
Associates Degree	103 (35.3)	327 (35.9)	
Bachelors or Higher	146 (50.0)	449 (49.3)	
Registered Nurse	278 (95.2)	856 (94.1)	.56
Licensed Practice Nurse	14 (4.8)	54 (5.9)	

Note. No demographic information was available from one subject in the analytic sample, and 136 non-responders in the sampling frame. Cells with fewer than five subjects obscured to maintain privacy.

Table 2

Modified Practice Environment Scale of the Nursing Work Index Subscale Scores

Subscale	Analytic Sample (n=293)	Practice Environment Reported as Favorable (n=213)	Practice Environment Reported as Mixed/Unfavorable (n=80)	<i>p</i>
Mean (SD)				
Staffing and Resource Adequacy	3.52 (0.96)	3.81 (0.78)	2.75 (1.00)	<.001
Nursing Foundations for Quality of Care	4.12 (0.64)	4.27 (0.59)	3.77 (0.61)	<.001
Nurse Participation in Practice Affairs	3.16 (0.83)	3.37 (0.75)	2.62 (0.83)	<.001
Nurse Manager Ability, Leadership, and Support of Nurses	3.55 (0.94)	3.79 (0.79)	2.93 (1.03)	<.001
Collegial Nurse-Physician Relationships	4.02 (0.77)	4.17 (0.68)	3.64 (0.85)	<.001
Medical Assistant Support	3.55 (1.03)	3.65 (0.99)	3.26 (1.16)	<.01
Composite (all items)	3.59 (0.64)	3.78 (0.55)	3.09 (0.62)	<.001

Note. In contrast with prior publications (Lake, 2002), items were scaled: 1 = strongly disagree, 2 = agree, 3 = neutral, 4= agree, and 5 = strongly agree. A neutral category was added.

Table 3

Modified Practice Environment Scale of the Nursing Work Index: Descriptive and Internal Consistency Statistics, n=293

Subscale	Item	Mean (SD)	α
Staffing and Resource Adequacy (2 items)	Enough staff to get the work done	3.46(1.00)	0.89
	Enough registered nurses to provide quality patient care	3.58 (1.02)	
Nursing Foundations for Quality of Care (4 items)	High standards of nursing care are expected by the administration	4.24 (0.74)	0.80
	Working with nurses who are clinically competent	4.36 (0.76)	
	Nursing care is based on a patient-centered approach	4.15 (0.82)	
	A clear philosophy of nursing that pervades the patient care environment	3.73 (0.90)	
Nurse Participation in Practice Affairs (7 items)	Opportunity for staff nurses to participate in policy decisions	3.41 (1.08)	0.86
	Many opportunities for advancement of nursing personnel	2.81 (1.09)	
	Nurses have the opportunity to serve on committees	3.70 (1.02)	
	Staff nurses are involved in the management decisions of the facility	2.92 (1.10)	
	An administration that listens to and responds to employee concerns	3.24 (1.15)	
	A chief nursing officer who is highly visible and accessible to staff	2.92 (1.27)	
	A chief nursing officer equal in power and authority to other top level executives	3.09 (1.21)	
Nurse Manager Leadership, Ability, and Support of Nurses (5 items)	A supervisory staff that is supportive of nurses	3.61 (1.03)	0.90
	A head nurse/supervisor who backs up the nursing staff in decision making, even if the conflict is with a physician.	3.61 (1.22)	
	Praise and recognition for a job well done	3.50 (1.07)	
	A head nurse who is a good manager and leader	3.49 (1.18)	
	Supervisors use mistakes as learning opportunities, not criticism	3.54 (1.07)	
Collegial Nurse-Physician Relations (3 items)	A lot of team work between nurses and physicians	4.00 (0.88)	0.86
	Physicians and nurses have good working relationships	4.16 (0.79)	
	Collaboration (joint practice) between nurses and physicians	3.87 (0.93)	
Medical Assistant Support (2 items)	Medical assistants who help the care team	3.58 (1.14)	0.87
	Medical assistants contribute to smooth patient flow	3.53 (1.06)	

Note. In contrast with prior publications (Lake, 2002), items were scaled: 1 = strongly disagree, 2 = agree, 3 = neutral, 4= agree, and 5 = strongly agree. A neutral category was added.