

November 2018

# Correctional Nurse Competency and Quality Care Outcomes

Deborah Shelton

*University of Connecticut, School of Nursing, [deborah.shelton@uconn.edu](mailto:deborah.shelton@uconn.edu)*

Bill Barta

*University of Connecticut - Storrs, [billbarta@yahoo.com](mailto:billbarta@yahoo.com)*

louise A. reagan

*University of Connecticut - Storrs, [louise.reagan@uconn.edu](mailto:louise.reagan@uconn.edu)*

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## Recommended Citation

Shelton, Deborah; Barta, Bill; and reagan, louise A. (2018) "Correctional Nurse Competency and Quality Care Outcomes," *Journal for Evidence-based Practice in Correctional Health*: Vol. 2 : Iss. 1 , Article 3.

Available at: <https://opencommons.uconn.edu/jepch/vol2/iss1/3>

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**Methods:** Nursing outcomes were evaluated on four most frequently used nursing protocols. The education intervention consisted of self-directed computer-based modules, hands-on clinical review of skills, and validation of learning through high-fidelity simulation tailored for the correctional environment. A multilevel random coefficient modeling approach for analysis was utilized. Records reviewed at 7 facilities comprising a sample of 736 records were compared for nursing care performance between facilities.

**Findings:** The education intervention as designed increased nurse competency ( $t= 2.591$ ,  $df=729$ ,  $p=0.010$ ) on average 4% across the state system (facility range -4% to +10.8%). A four percent system change has been found to be an effective rate of change in other studies. Facilities with an overall higher RN to LPN ratio perform at a relatively high level ( $t=4.211$ ,  $df=730$ ,  $p=0.000$ ). Increase in inmate census without change in RN/LPN nurse staffing reduced performance ( $t= -4.347$ ,  $df=730$ ,  $p=0.000$ ).

**Conclusions:** This multi-component nursing education intervention improved quality of nursing care, most dramatically in the area of psychiatric care. Structural challenges related to paper charts and security suggest improvements may be seen with an electronic record system and expanded training between nursing and Correctional Officers for health care. An examination of the effectiveness of current models of care delivery may be warranted.

## Correctional Nurse Competency and Quality Care Outcomes

Corresponding Author: Deborah Shelton, PhD, RN, NE-BC, CCHP, FAAN  
Professor Emeritus, School of Nursing  
Center for Correctional Health Networks, University of Connecticut  
Consultant, Shelton Consulting Services  
[SheltonConsultingServices@gmail.com](mailto:SheltonConsultingServices@gmail.com)  
860-268-4425

William Barta, PhD Assistant Chief  
Quantitative Research Unit  
New Jersey State Judiciary  
Research Associate, Center or Correctional Health Networks

Louise Reagan, PhD, APRN, ANP-BC, FAANP  
Assistant Professor, School of Nursing  
Director, Center for Correctional Health Networks

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expanded training between nursing and Correctional Officers for health care. An examination of the effectiveness of current models of care delivery may be warranted.

## Introduction

Quality care is increasingly linked to a health system's financial health. Adverse outcomes related to maintaining an adequate number of qualified staff has an impact on a health system's bottom line. The most direct example of the quality-finance link is seen in the 24-hour, 7 days-a-week services that can be directly tied to or influenced by nursing, such as preventable hospital-acquired infections or missed care (American Nurses Association, 2000; Faller, 2012).

Maintaining an adequate number of qualified staff may be the biggest challenge to quality care delivery. An optimal staffing model requires an approach that recognizes the unique patient care setting, time of day and assessment of acuity, delegation of work assignments to unlicensed assistive personnel, as well as the skills, education, and training within specific settings (ANA, 2016). Additionally, some permanent nurses experience resentment in the employment of locum tenens nurses who may be paid at higher rates, perceived as less efficient and needing support from permanent staff (Aiken, Xue, Clarke & Sloane, 2007). Aiken et al (2007) report that more nonpermanent nurses are employed in settings where staffing and other resources are lower. Consequently, use of temporary staff to address staffing shortages may actually imply a weaker commitment of permanent nurses to their jobs rather than a negative impact of the temporary nurses themselves. Other concerns regarding supplemental staffing typically raised include efforts by nurse managers to reduce expenses associated with staffing, particularly when nurses there are other staff problems such as retention and quality of care.

There is mounting evidence that links nurse staffing to several key challenges that impact their profitability- specifically recruitment and retention of qualified staff. Researchers estimated that costs can approach \$70,000 per nurse turned, considering personnel expenses and the impact on productivity and quality (PWC, 2007). A 2007 PricewaterhouseCoopers Health Research Institute study found that hospitals that perform poorly in nurse retention (defined as a median voluntary turnover rate for first-year nurses greater than 27.1%) spend an average of \$3.6 million more per year than those with high retention rates. Attracting and retaining an adequate number of qualified correctional nurses and other medical professionals is difficult due to the undesirability of working in correctional facilities; security-related, organization-level occupational stressors; and the effects of high turnover on the workloads of remaining nursing staff (Shelton, Weiskopf & Nicholson, 2010).

Related to staffing, quality of correctional health care is influenced in part to the historical growth in both the number of incarcerated persons, the aging of the incarcerated population, and the progression of chronic illness in this population and the limited number and limited mix of clinical staff (Loeb, Steffensmeier, & Lawrence, 2008). Relative to the general population, incarcerated persons exhibit a disproportionate burden of physical and/or psychiatric chronic illness and complex comorbidities (Dumont, Allen, Brockmann, Alexander, & Rich, 2013). Some medical self-care behaviors that community-dwelling adults can perform for themselves – even tasks as basic as taking one’s own medication – are not always permitted in correctional settings (Marshall, Simpson, & Stevens, 2001). In addition, the American Bar Association, citing Supreme Court decisions, has recently set higher standards regarding the level of medical care that inmates are entitled to receive (ABA, 2011). These standards are not

applied across all facilities nationally, and cover a variety of topics from adequate facilities, equipment and resources, to treatment and evaluation services for mentally ill held in these facilities.

Lastly, the discussion regarding factors that influence quality of care behind bars cannot ignore the environment in which care is provided. Most studies of nurse staffing and health care outcomes discuss tailoring of work environments to be more conducive to patient safety (Page, 2004). Provision of care within a correctional environment does not afford this luxury. Correctional Officers and health care providers alike must attend to inmates' well-being and the facility's security simultaneously (Moore, 2005), with priority given to safety and security. Therein lies the potential for conflict with quality care delivery.

In this paper, we report on a staffing model developed to improve quality of care following implementation of a correctional nurse competency education intervention to a statewide correctional nursing staff. This intervention strategy included the use of a mobile learning lab containing a high-fidelity nursing simulation classroom that travels to correctional facilities across the state of Connecticut (Shelton, Reagan, Weiskopf, Panosky, Nicholson & Diaz, 2015; Diaz, Panosky & Shelton, 2014). This design was estimated to reduce the costs associated with nurse travel to remote training locations, reduce costs associated with coverage for time away from patient care and increased burden on remaining staff- while still providing high-quality "hands-on" training for all nursing personnel- estimated to be approximately \$400 per nurse per training. Currently, costs for continuing education of health care staff varies from state to state based upon licensure and certification requirements (Forester, 2017), but mandatory

continuing education requirements continue to be implemented to sustain quality outcomes and reduce errors (ANCC, 2012).

### Background

Correctional nursing is unlike any other nursing specialty. The nurses who work in these custodial environments fulfill a wide range of roles, which differ from nurses working in other clinical settings. The daily practice of these nurses taps the knowledge and skills base of a variety of clinical nursing domains (Shelton, Weiskopf & Nicholson, 2010). Nursing education programs generally do not prepare students for correctional nursing, and even if they did, correctional recruiters may be reticent to hire inexperienced nurses due to the lack of developmental programming in correctional systems once hired. As a result, nurses start work in this specialty without all the required competencies. This contributes in part to the high attrition of new nurses, and even among experienced nurses the competencies are lacking in at least one or more area required to provide care for this population.

In *Corrections Nursing: Scope and Standards of Practice*, the American Nurses Association (ANA) outlines the underpinnings of correctional nursing (ANA, 2007; 2013). The application of these standards to the practice environment are not easily applied to patients who have complex physical, emotional and addiction health care needs and that must be delivered in an environment that requires compliance with rigorous security policies and protocols. Education and training targeting these environmental challenges at pre-licensure and post-baccalaureate levels or through certificate programs are lacking in the nation and impact upon provision of services for a population that suffers the cumulative effects of health disparities. Further, this puts the burden of training upon the clinical system. Upon hiring,

nurses have a basic skill set that needs to be enhanced so that the nurses themselves are safe, and their transition is successful in this environment. An additional cost burden exists, as there is high demand to place nurses in the clinical setting quickly. Once there, it is difficult to remove these nurses for additional training due to these same demands.

In the recent Institute of Medicine report on nursing (IOM, 2010), recommendation 6 calls upon the discipline to “Ensure that nurses engage in lifelong learning...to gain the competencies needed to provide care for diverse populations across the lifespan.” (p.7-12). In this report, recommendation 6 suggests that health care organizations offer continuing competency programs that impact clinical outcomes, and that these programs be evaluated for their adaptability, flexibility and accessibility.

#### Approach

A participatory approach guided the development of this project to design, implement and evaluate the effectiveness of a correctional nurse competency program. Early stages of project engagement with stakeholders can be found elsewhere (Shelton et al, 2010; 2015). Nurse training was completed at 12 separate correctional facilities that comprised an entire state system and involved 434 nurses of varying licensure status (LPN, RN, APRN) (HRSA # D11HP22212; IRB # H13-307).

The *educational intervention*, grounded in adult learning principles, was designed to engage nurses in active learning through a series of exercises that spanned two-months for each facility per year. These included a computer-based and self-directed knowledge development and/or review; skills practice in the facility with or without a peer-mentor; and a demonstration of learned knowledge through simulation and debrief. Each step was validated

by the nurse participant upon completion. The educational program in totality was provided over a three-year period of time, with unique content provided to each facility three times.

Upon arrival to a facility, over a two-month period of time, pre-test evaluations were completed (Time 1) before training, and followed immediately by a posttest (Time 2) after training for one of four targeted high demand nursing care conditions (back pain, skin rash, gastrointestinal complaints and asthma). At the request of the prison nursing management, data were not linked to individual nurses, but linked to facility, and level of participation. Reported here are the pencil and paper pre-test and post-test evaluations which consisted of reviewing nurses' documented nursing care protocol performance during patient interactions. Moderators such as number of nurses, type of licensure and nurse turnover, inmate census, and level of facility security as well as level of health care service were considered. Further explanation of variables follows below. Total system improvement was determined between 2010 and 2013.

### Methods

A mixed method design with retrospective chart review, observations and interviews (analysis of interviews is in process) were used to examine gains in nursing performance following the provision of a correctional nurse education intervention designed to improve clinical competency and to improve the quality of nursing care. We hypothesized that nurse and facility factors (defined below) could affect the clinical outcome (adherence to four chronic disease nursing care protocols) following the educational intervention. To assess the clinical outcome, nurse protocols or clinical guides designed for nurses were to align care with department policy. Non-adherence to the protocol was an opportunity for error or missed care.

Four protocols associated with the most frequently reported chief medical complaint were identified as: gastrointestinal distress, skin problems, asthma, and back pain/discomfort. A positive change score on completion of nursing protocols as documented in the medical record and through observations following the educational intervention was the goal.

*Data extraction.* Retrieval of records information was achieved by creating data extraction forms for these four targeted clinical protocols, guided by nursing policy on care for the selected topics (back pain, skin rash, gastrointestinal complaints and asthma) and in collaboration with correctional nurses and nurse supervisors. Data extraction forms were created as checklists to identify that the required step-in care was 'met', 'not met', 'did not apply', or was 'unknown'. An additional column was provided for any notes or questions that arose during data extraction and acted as an alert for faculty to check that record and meet with the GA to clarify questions. These data extraction forms were pilot tested in two different facilities (n=8 records), results were reviewed by both academic and correctional nurse partners to assure alignment with policy guidelines, modified to simplify their use, and deemed appropriate for the purposes of this study. Fidelity of recorded data, forms and actual care were also performed and discussed below.

*Data Coding.* Two nursing research assistants (RAs) were trained for record data extraction. Inter-rater reliability was manually tabulated for RAs who scored the same four records-one per type of protocol. Each RA identified the nursing care steps as identified in the medical record as 'met', 'not met', 'did not apply', or 'unknown' and divided by the total number of steps required to reach the nursing diagnosis chosen by the nurse for a total protocol score. Accuracy of the nursing diagnosis was not judged, rather adherence to nursing protocol

guidelines. The difference between the coders yielded an inadequate level of agreement (56.00%). Nursing Faculty examined the extraction forms with the records to determine where the focus of additional training was needed. In meeting with RAs, the difficulty reported was related to confidence in reviewing the record, familiarity with the structure of the medical record and use of the protocol which was designed as a decision-tree to guide the nurse in reaching a nursing diagnosis. Following additional training and practice extractions, a second set of four protocols and the records were coded by RAs. This time, the level of agreement was satisfactory (93.75%).

It was unreasonable to track the selected patient episodes of care due to the cumbersome nature of this record system, the frequent movement of the population between facilities and release to the community. An alternate strategy was needed as multiple simultaneous demands were made upon these paper records (i.e. waiting for a physician signature or used for clinics). Not wanting to disrupt care, record reviews were shifted to off-hours and required repetitive searches to locate records. Review of records needed to occur with supervision of the medical records office within each facility. Records were reviewed if they met the criteria of a patient received care between 2010 and 2013 grant dates. With the assistance of clinicians and the medical records staff, we were able to identify those records of patients where the four targeted chronic medical conditions were documented. This procedure, albeit cumbersome, netted a total of 736 protocols from a sample of 7 facilities, with 298 protocols corresponding to Time 1 (pre-test) and 448 protocols corresponding to Time 2 (post-test).

*Global Estimate of Fidelity.* We hypothesized that nurses provided more care than was documented in the records due to the cumbersome nature of the record system making access

to records difficult as clinicians sought to use the record at the same time. Consequently, loose notes filed in medical records may not have been filed at a time that coincided with our record reviews. To validate the accuracy with which protocol documentation were completed and the ability of the protocols to capture care as designed for this purpose, we observed nurses performing patient care. Following an observation, the corresponding record was reviewed and linked to the observation. Based on a total sample of 34 observations, a measure of accuracy based on correct entries relative to total entries (combining inaccurately checked and inaccurately omitted items) was obtained. A satisfactory global estimate of protocol fidelity was determined at 0.741 (weighted average).

*CNCP Intervention.* The educational intervention consisted of unique content designed to meet needs determined through an assessment (Shelton et al., 2010). The basic structure of the program included on-line modules, in-facility skills development, and simulation demonstration of learning took 3-4 months to complete. This pattern of educational instruction was delivered to eleven facilities twice per year over a three-year period of time with the use of a mobile simulation learning laboratory and development of a team of nurse educators located in each facility. Continuing Education (CE) Credits were awarded for all educational activities.

*Nurse-Level Variables.* Constraints were placed upon the design of this study by the agency. We could not track these unionized individual nurses, and felt that tracking patients was too difficult for reasons mentioned previously. We did track nursing care provided by facility, which for the most part had stable staffing. We hypothesized that there would be an effect on performance based upon licensure status (RN, LPN, APRN), and estimated this using

aggregate data on the relative proportion of RNs, LPNs, and APRNs at each facility. Other factors, such as average age and tenure of the nurse by facility, were also evaluated as suggested by nursing studies in community settings.

*Facility-Level Variables.* Based on administrative data, variation among facilities was observed with respect to inmate census (average number incarcerated at a given time), inmate gender, number of nurses employed, facility security (1-5 reflecting high security to low security) and level of health service as designated by the Department of Correction (hi-medium-low intensity) was evaluated. These variables were felt to impact burden upon care providers. As an example, higher facility security requires more rigorous population control which affects population movement (access of the patient to provider, or provider to the patient).

*Outcome Variables.* The information contained in completed protocols differs by medical condition (request for clinical service by patient) in that the number of clinical decision-making steps followed to reach a nursing diagnosis for the patient complaint (i.e. back pain) vary, thus limiting the ability to generalize across medical conditions. For example, the protocol for rash included assessments for allergy, infestations, athlete's foot, acne, and herpes zoster leading to different decision trees. Comparing this with back pain, the assessments for kidney and bladder difficulties, injuries, testicular pain and pregnancy were not possible. This was resolved by further coding to sum the total number of protocol decision-making steps completed within the steps of the nursing process and deemed appropriate for the medical complaint as assessed by the nurse. The number of steps documented as completed by the nurse was compared to the total number of steps that were required by the protocol policy for quality care. An excerpt of the protocol for back pain, is given as an example to demonstrate the decision tree which

guides the clinical assessment as the nurse determines the appropriate plan of action (see Table 1).

Table 1: Comparison of Back Pain Protocol with SOAPE Guidelines

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Subjective items from the Nursing Process component within the Back Pain Protocol

- (1) Did the complaint in the sick call log match what the nurse documented as the reason?
  - (2) Did the nurse document the onset of symptoms?
  - (3) Did the nurse document the duration of symptoms?
  - (4) Did the nurse document what makes the symptoms better?
  - (5) Did the nurse document the frequency of symptoms?
  - (6) Did the nurse document the severity of the symptoms?
  - (7) Did the nurse document the quality of the pain (dull, aching, throbbing, etc.)?
  - (8) Did the nurse document other associated symptoms (swelling, fever, impaired mobility, etc.)?
  - (9) Did the nurse document what triggered the symptoms?
  - (10) Did the nurse document an assessment for allergies and other contraindications?
- 

Subjective items from the SOAPE guidelines for back pain complaints

- (1) Did the complaint in the sick call log match what the nurse documented as the reason?
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(9) Did the nurse document what triggered the symptoms?

(10) Did the nurse document an assessment for allergies and other contraindications?

*Plan of Analysis.* Variability in baseline nurse performance would make it more difficult to detect a significant effect of the education intervention unless facility-specific variation is considered. Similarly, if nurses demonstrate variation in their baseline level of proficiency across medical conditions, this too influences the ability to tease out an effect of training. Conventional statistical approaches partition data points into cells, which in this case would require partitions for Time 1 and Time 2 and by facility or medical condition, with statistical power limited by cell size. A multilevel random coefficient modeling approach, in contrast, does not incur the same loss of statistical power and is more informative in terms of assessing whether facility-specific or condition-specific factors moderate the effect of the training intervention. In this study, records obtained at each facility reflecting instances of nursing care at that facility were analyzed. Although only 7 facilities were sampled, a total of 736 records were used as the basis for comparing performance between facilities.

Lacking a basis for estimating an expected effect size, the sample was generated on a case available basis, as limited by the resources required to document instances of each complaint. There was a concern that the low number of clusters, specifically, 4 complaints and 7 facilities, might limit the power to detect an effect. This justified seeking a large level 1 (in the 3-level model) sample of 736 records.

For the 3-level model employed in the present analysis, the first level is composed of 736 records with a Level 1 error term estimating between-record variation. In these models, the error term is calculated as the deviance of each record relative to the fitted model. At the

second nested level of analysis, records are grouped by medical condition, with an error term estimating between-condition variation. This yields a sample of 26 (4 medical conditions x 7 facilities, minus 2 instances in which no data exist for a particular condition). The third nested level of analysis is correctional facility, with an error term estimating between-facility variation that is otherwise unaccounted for by the other variables included in the model. For example, the patient case mix or organizational factors might vary from facility to facility, accounting for facility-level variation that is not captured by the variables included in the model.

## Results

Table 2 provides the average for facility-based performance for the 7 facilities included in the education intervention. Again, scores represent the proportion of complaint-specific appropriate steps performed over all steps listed on a protocol. With the exception of Facilities 3 and 7, visual inspection of Table 3 suggests an improvement from Time 1 to Time 2. Table 3 provides a breakdown by medical condition. The pattern of findings diverges from those seen in the breakdown by facility because there are evident differences in baseline performance by medical condition related to number of care steps in the various protocols.

**Table 2:** Performance by Facility

Facility	Time 1	Time 2
	Mean (n)	
1 intake	0.661 (23)	0.685 (88)
2	0.736 (39)	0.755 (45)
3	0.745 (40)	0.698 (65)
4 MH	0.622 (60)	0.730 (62)
5 dialysis	0.689 (54)	0.737 (59)
6	0.641 (56)	0.712 (39)
7 women	0.740 (16)	0.714 (90)
<i>Weighted Avg:</i>	0.692 (298)	0.722 (448)

**Table 3:** Performance by Medical Condition

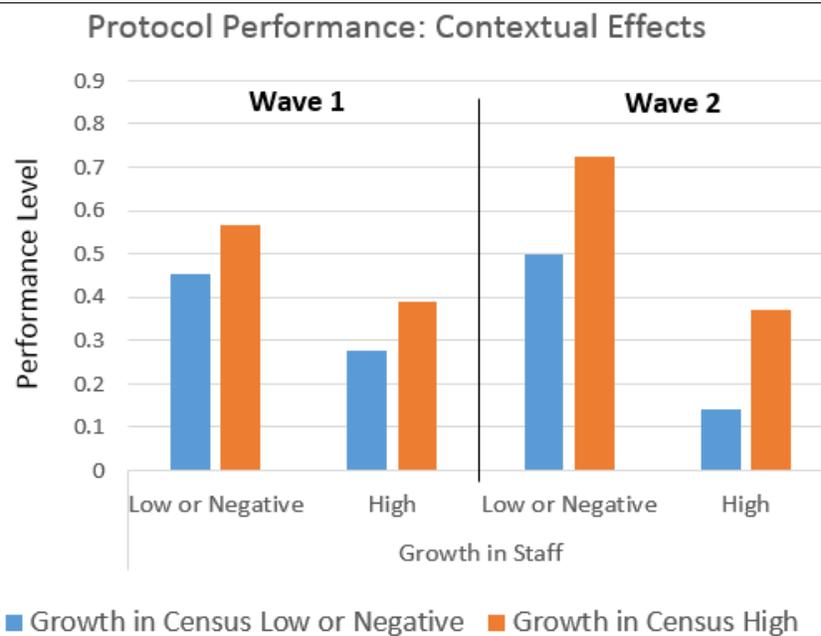
Condition	Time 1	Time 2
	Mean (n)	
Asthma	0.598 (40)	.716 (112)
Back Complaints	0.604 (81)	0.657 (98)
Gastrointestinal	0.461 (52)	0.492 (81)
Skin	0.841 (125)	0.866 (157)
<i>Weighted Avg:</i>	0.628 (298)	0.684 (448)

*Main Findings.* The 3-level model is designed to test the specific hypothesis that change in protocol performance between Time 1 (2010) and Time 2 (2013), following the completion of training at all 7 facilities is moderated by facility-level differences in Time 2, inmate census and Time 2 nursing (RN/LPN/APRN) staffing level. Also, control variables included in the model are fidelity, Time 1 inmate census and Time 1 nursing staffing level.

As shown in Table 4, the intercept of the slope for treatment is not significant at the .05 threshold, indicating that initial levels of performance across facilities and across conditions is comparable after considering between-facility and between-condition variation. There is, however, a significant effect of treatment moderated by inmate census suggesting that facilities with relatively high census at Time 2 exhibited less improvement in performance following training, when compared to other facilities. Also, there is a significant moderating effect of nurse staffing level, where facilities experiencing an increase in staffing, as compared to other facilities, show a higher gain in training-related performance. This pattern of findings is presented graphically in Figure 1, and indicate that staffing and census have an influence on performance.

**Table 4.** First Model: Effects of Census and Staffing Levels

	Coeff	s.e.	t-ratio	d.f. (approx.)	<i>p</i> value
<b>Intercept</b>				3	
Intercept	0.5647	0.2095	2.965		0.069
Fidelity	-0.4090	0.5796	-0.706		0.531
Inmate Census 2010	-0.0345	0.3093	-0.111		0.919
Nurse Staffing 2010	-0.2730	0.1974	-1.383		0.260
<b>Treatment</b>				729	
Intercept	-0.0554	0.0303	1.829		0.067
Inmate Census 2013	-0.2375	0.0499	-4.763		0.000
Nurse Staffing 2013	0.1517	0.0586	2.591		0.010

**Figure 1.** Effects of Change in Census and Change in Staffing Level

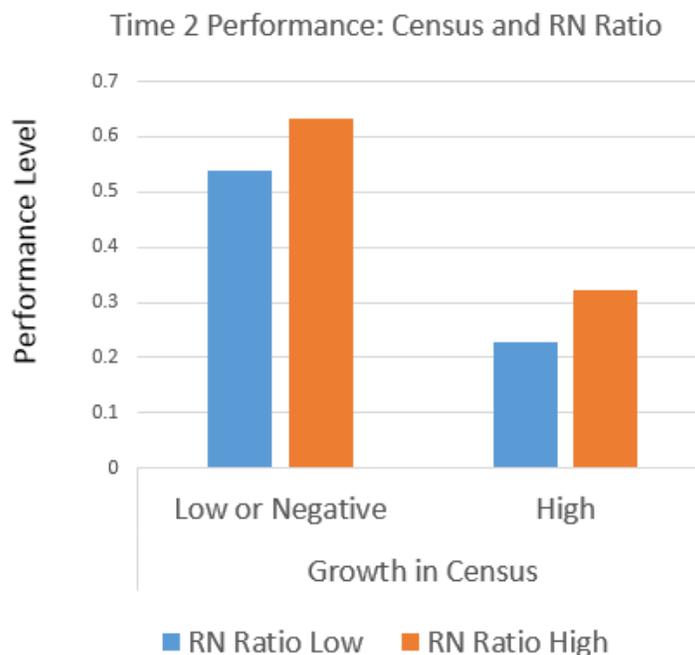
Even though the observed fidelity cases do not predict improved performance, it does account for substantial variation in the model, as reflected by the large value of the coefficient. And although census and staffing at Time 1 (2010) are not significant in the model, they are included in the analyses to control for baseline differences by facility.

*Effect of RN Ratio.* To further explore the relationship between nurse staffing, census and performance, it was hypothesized that facilities with a higher proportion of RNs to total nursing staff would perform at a higher level at Time 1 and Time 2 (IOM, 2011). To test this, RN ratio was added to the model. After this variable was added, fidelity and staffing level at Time 2 no longer improved the fit of the model and were omitted. The resulting model (Table 5) shows that facilities with a higher RN ratio perform at a relatively high level, and training-related improvement is correspondingly higher. Increase in inmate census reduces performance, indicating there is some cut-off number of RNs to patients required for quality care.

**Table 5. Second Model: Contextual Factors and RN Ratio**

	Coeff	s.e.	t-ratio	d.f. (approximate)	p value
<b>Intercept</b>				3	
Intercept	0.5483	0.7228	0.759		0.503
RN Ratio 2010	-0.3600	1.3234	-0.272		0.803
Census 2010	0.3227	0.4019	0.803		0.481
Employed 2010	-0.0985	0.1881	-0.523		0.636
<b>Wave</b>				730	
RN Ratio 2013	0.1958	0.0465	4.211		0.000
Census 2013	-0.2099	0.0483	-4.347		0.000

Figure 2 provides a graphic comparison of Time 2 performance at different levels of inmate census and RN ratio. In both the “low census” scenario and the “high census” scenario (determined by an increase in census or decrease between Time 1 and Time 2), facilities with a high RN ratio perform at a higher level than facilities with a relatively low RN ratio.

**Figure 2.** Model Incorporating RN Ratio

### Discussion

This paper seeks to provide evidence regarding the effectiveness of correctional nurse competency and those factors contributing to quality of care in a correctional health environment. Documentation of correctional nurse specific studies are limited.

Clinical competency of nurses was improved ( $t= 2.591$ ,  $df 729$ ,  $p=0.010$ ) with adherence to four medical care protocols, interpreted as improved patient care. Development of comprehensive nursing protocols assist the nurse to make appropriate decisions for specific clinical situations leading to quality patient care (IOM, 1990).

The education intervention as designed increased nurse competency on average 4% across the state system (facility range -4% to +10.8%), with the greatest impact in the facility providing services to inmates with mental health disorders. A four percent system-wide change has

been found to be equivalent to system changes noted in other studies (Aiken et al, 2011; Aiken et al, 2007). Those facilities with the least performance improvement had highly unstable nurse staffing and large population shifts at their facilities during the study, adding burden to the nursing role. Expanding the number of nurse educators and enhancing their competencies as simulation educators provided this system with the tools for improving care after the completion of the project.

The outcomes achieved are attributed to the educational design of the intervention which included the use of the scaffolding of teaching methods to reach varied learning styles and to repeating content at each step (Knowles, 1984). Use of a non-punitive approach with staff, reaching out to individuals as needed and faculty always being available to nurses all through the process were reported by nurses in evaluations. As clinicians, there was a tendency to want to lean toward “work-arounds” or short-cuts (such as skipping on-line modules due to perceived time constraints), but with support of the Director for Nursing and Nursing Supervisors, faculty kept reinforcing the educational design, theory and principles. Bi-annual educational boosters on program components were felt to be needed as the educational intervention became rooted in the culture. These educational events continue for purposes of sustainability.

The number of RNs contributed toward improved care outcomes ( $t=4.211$ ,  $df=730$ ,  $p=0.000$ ) due to their scope of practice as defined by the State Board of Nursing. This was not true when the ratio of total nurses was too low to provide care for the number of patients ( $t= -4.347$ ,  $df=730$ ,  $p=0.000$ ). A ratio of one nurse (RN or LPN) to 25 incarcerated persons (total population of the system) was estimated as the cut-off for quality care in this system.

Although LPNs have a more limited scope of practice within the facilities (generally limited to screening and medication management), their supportive role is essential. Much of LPN work has to be supervised requiring co-signature of the RN, which may not be a cost-efficient strategy for provision of care. Over the years in which this project occurred, a greater number of RNs were hired, leading to a staff comprised of 64% RNs (including supervisors and APRNs) to 26% LPNs, or slightly over 2 RN FTE's to 1 LPN FTE. Costs of this staffing shift was off-set in part by the 0.9% reduction in turn-over, improved recruitment and improved functioning of the Nursing Department. Further study of these variables is needed.

An examination of the centralized model (patients brought to the medical unit) utilized here compared to alternate de-centralized models, or perhaps newer models that incorporate greater reliance upon technology (such as automated medication dispensing, or use of telehealth internal to a facility) are needed as well as consideration for the structure of prison buildings in relationship to provision of health care if total health care costs remain as high as they have been.

### Conclusion

This project found that with visionary leadership and HRSA funding, a partnership of academic and clinical nurse partners met the challenges of the state's correctional environment to improve clinical nursing care by better aligning nursing approaches to care within an environment demanding the priority of safety and security requirements.

The design of CNCP<sup>®</sup> to engage and empower these correctional nurses has been reported to promote program sustainability (Drayton & Weston, 2015). Providing the staff with tools to direct their own professional development by design encourages staff to continue the

program. Although not discussed in this paper, nurses reported in evaluation of the program that the approach to professional development renewed and refreshed their clinical knowledge and skills. A positive difference in the attitudes of nurses was noted at the end of year 1 by faculty. The consistent voluntary participation in the program and the certification of 25% of the nursing staff spoke to program benefits attributed to competency development (ANA, 2002)

This university-based correctional health care system aspired to provide a level of education and number of RNs for its patient population in the belief that this is a quality driver. As noted in the findings here, RNs can improve care. The debate regarding RN-LPN ratio in prisons and jails may be focused upon costs vs care. Yet, there may be other factors to consider. Some correctional systems are lobbying their states to expand the LPN scope of practice so as to provide more care to incarcerated persons. This approach is not supported by authors, or much of the nursing profession (Baker & Williams, 2016) as it appears to be “kicking the can down the road” rather than deal with the complex issues of providing correctional health. Nothing replaces the assessment, critical thinking and decision-making skills of the registered nurse (RN). And while costs are a serious issue, models of correctional health care delivery, design of prison and jail buildings, reducing census through diversion and transition programming, enhanced partnerships with academia, and addressing the difficulties with recruitment of qualified staff should be examined before opting for fewer numbers, and/or less qualified providers.

These are undoubtedly difficult environments to work in with very challenging populations. Recognizing that prisons and jails have expanded roles beyond public safety and security in the

current social service system may assist in addressing costs associated with health care. The most skilled and competent nursing individuals, RNS and LPNs, are needed to effect change in quality health and safety outcomes which can ultimately reduce costs.

## References

- Aiken, LH, Cimiotti, JP, Sloane, DM, Smith, HL, Flynn, L. & Neff, DF. (2011). The Effects of Nurse Staffing and Nurse Education on Patient Deaths in Hospitals with Different Nurse Work Environments. *Med Care*; 49(12): 1047–1053. doi: 10.1097/MLR.0b013e3182330b6e.
- Aiken LH, Xue, Y, Clarke, SP & Sloane, DM. (2007). Supplemental Nurse Staffing in Hospitals and Quality of Care. *J Nurs Adm*; 37(7-8): 335–342. PMC2978921.
- American Nurses Association. (2016). *Nurse Staffing*. Washington DC: American Nurses Association. [On-line: <http://www.nursingworld.org/nursestaffing> ].
- American Nurses Association. (2002). *Continuing professional nursing competence: Nursing's agenda for the 21st century*. Silver Springs, MD: Author.
- American Nurses Association. (2000). *Nurse Staffing and Patient Outcomes in the Inpatient Hospital Setting*. Washington DC: American Nurses Association.
- American Nurses Credentialing Center's Commission on Accreditation (2012). *The Value of Accreditation for Continuing Nursing Education: Quality Education Contributing to Quality Outcomes*. Silver Spring, MD: American Nurses Credentialing Center.
- American Bar Association (ABA, 2011). *ABA standards for criminal justice: Treatment of prisoners*. Washington, DC: ABA.
- Baker, K. & Williams, T.E. (2016). Overview and Summary: Elimination of Barriers to RN Scope of Practice: Opportunities and Challenges. *OJIN*: 21 (3). [On-line at: [ojin.nursingworld.org/MainMenuCategories/ANAMarketplace/ANAPeriodicals/OJIN/TableofContents/Vol-21-2016/No3-Sept-2016/OS-Elimination-of-Barriers-to-RN-Scope-of-Practice.html](http://ojin.nursingworld.org/MainMenuCategories/ANAMarketplace/ANAPeriodicals/OJIN/TableofContents/Vol-21-2016/No3-Sept-2016/OS-Elimination-of-Barriers-to-RN-Scope-of-Practice.html)].
- Diaz, DA., Panosky, DM. & Shelton, D. (2014). Simulation: Introduction to correctional nursing in a prison setting. *Journal of Correctional Health Care*, 20 (3): 240-248.
- Drayton, N. & Weston, K.W. (2015). Exploring values in nursing: generating new perspectives on clinical practice. *Australian Journal of Advanced Nursing*, 33(1): 14-22.
- Dumont, D.M., Allen, S.A., Brockmann, B.W., Alexander, N.E., & Rich, J.D. (2013). Incarceration, community health, and racial disparities. *Journal of Health Care for the Poor and Underserved*, 24: 78–88.

Forester, H. (2017). CEU's: Virtual learning vs Being there. Nursing Link. [on-line] <http://nursinglink.monster.com/education/articles/8398-ceus--virtual-learning-vs-being-there>.

Institute of Medicine (2011). Committee on the Robert Wood Johnson Foundation Initiative on the Future of Nursing. Washington, DC: National Academies Press.

Kane R.L., Shamliyan, T.A., Mueller, C., Duval, S. & Wilt, T.J. (2007). The association of registered nurse staffing levels and patient outcomes: systematic review and meta-analysis. *Med Care*; 45:1195–1204. PMID: 18007170.

Knowles, M. (1984). *Andragogy in Action*. San Francisco: Jossey-Bass.

Loeb, S.J., Steffensmeier, D. & Lawrence, F. (2008). Comparing incarcerated and community-dwelling older men's health. *Western Journal of Nursing Research*, 30 (2), 234-249.

Marshall, T., Simpson, S. & Stevens, A. (2001). Use of health services by prison inmates: Comparisons with the community. *Journal of Epidemiology and Community Health*, 55, 364-365.

Moore, J. (2005). Public Health behind Bars: Health Care for Jail Inmates. *Popular Government*, Fall; 16-23. [on-line: <http://sogpubs.unc.edu/electronicversions/pg/pgfal05/article2.pdf>].

Page, A. (2004). (Ed.) *Keeping patients safe: Transforming the Work Environment of Nurses*. Committee on the Work Environment for Nurses and Patient Safety, Board on Health Care Services. Institute of Medicine. Washington, D.C.: The National Academies Press.

PricewaterhouseCoopers' Health Research Institute. (2007). What works\* Healing the healthcare staffing shortage. [On-line] <http://www.wiche.edu/info/agendaBook/nov07/presentations/Carporelli.pdf>.

Shelton, D., Reagan, L., Weiskopf, C., Panosky, D., Nicholson, M. & Diaz, D. (2015). Correctional Nurse Baseline Indicators and Implementation Strategies Applied to a Statewide Correctional Nurse Competencies Program – Midyear report. *Journal for Continuing Education in Nursing*, 46 (10) 455-461. Doi: 10.3928/00220124-2015.

Shelton, D., Weiskopf, C., & Nicholson, M. (2010). Correctional nursing competency development in the Connecticut correctional managed health care program. *Journal of Correctional Health Care*, 16 (4), 299-309.

Shiffman, R.N. (1990) Clinical practice guidelines we can trust. Institute of Medicine Committee on Standards for Developing Trustworthy Clinical Practice Guidelines. Washington, DC: National Academies Press.