UC Irvine
UC Irvine Previously Published Works

Title

Refining and validating a conceptual model of Clinical Nurse Leader integrated care delivery

Permalink

Journal

ISSN

Authors

Bender, Miriam
Williams, Marjory
Su, Wei
et al.

Publication Date

DOI

Peer reviewed

ORIGINAL RESEARCH: EMPIRICAL RESEARCH - MIXED METHODS

Refining and validating a conceptual model of Clinical Nurse Leader integrated care delivery

Miriam Bender, Marjory Williams, Wei Su & Lisle Hites

Correspondence to M. Bender:
e-mail: miriamb@uci.edu

Miriam Bender PhD RN
Assistant Professor
Program in Nursing Science, University of
California, Irvine, California, USA

Marjory Williams PhD NEA-BC RN
Associate Chief Nursing Research
Central Texas Veterans Health Care System,
Temple, Texas, USA

Wei Su PhD
Program Manager
Evaluation and Assessment Unit, School of
Public Health, University of Alabama at
Birmingham, Alabama, USA

Lisle Hites PhD
Associate Professor/Director
Evaluation and Assessment Unit,
Department of Health Care Organization
and Policy, The University of Alabama at
Birmingham, Alabama, USA

Abstract

Aims. To empirically validate a conceptual model of Clinical Nurse Leader integrated care delivery.

Background. There is limited evidence of frontline care delivery models that consistently achieve quality patient outcomes. Clinical Nurse Leader integrated care delivery is a promising nursing model with a growing record of success. However, theoretical clarity is necessary to generate causal evidence of effectiveness.

Design. Sequential mixed methods.

Methods. A preliminary Clinical Nurse Leader practice model was refined and survey items developed to correspond with model domains, using focus groups and a Delphi process with a multi-professional expert panel. The survey was administered in 2015 to clinicians and administrators involved in Clinical Nurse Leader initiatives. Confirmatory factor analysis and structural equation modelling were used to validate the measurement and model structure.

Results. Final sample $n = 518$. The model incorporates 13 components organized into five conceptual domains: 'Readiness for Clinical Nurse Leader integrated care delivery'; 'Structuring Clinical Nurse Leader integrated care delivery'; 'Clinical Nurse Leader Practice: Continuous Clinical Leadership'; 'Outcomes of Clinical Nurse Leader integrated care delivery'; and 'Value'. Sample data had good fit with specified model and two-level measurement structure. All hypothesized pathways were significant, with strong coefficients suggesting good fit between theorized and observed path relationships.

Conclusions. The validated model articulates an explanatory pathway of Clinical Nurse Leader integrated care delivery, including Clinical Nurse Leader practices that result in improved care dynamics and patient outcomes. The validated model provides a basis for testing in practice to generate evidence that can be deployed across the healthcare spectrum.

Keywords: care delivery model, clinical leadership, clinical nurse leader, nursing, structure equation modelling

Why is this research or review needed?

- Clinical Nurse Leader integrated care delivery is a promising nursing-led model with a growing track record of success: however, theoretical clarity is necessary to generate causal evidence of effectiveness that can be deployed across the healthcare spectrum.

What are the key findings?

- This study provided empirical support for a conceptual model of Clinical Nurse Leader practice that results show is valid and credible across diverse care settings.

How should the findings be used to influence policy/practice/research/education?

- The model provides a basis for measuring and comparing Clinical Nurse Leader integrated care delivery structuring and practice in a standardized way and linking model domains and components to quantified patient quality and safety outcomes.

Introduction

The American Association of Colleges of Nursing (AACN) launched the Clinical Nurse Leader (CNL) initiative more than a decade ago as a key nursing strategy for redesigning care delivery to address quality and safety gaps. The CNL is a Registered Nurse with a Master's level education and advanced competencies in clinical leadership, care environment management and clinical outcomes management (AACN 2007). The current evidence supporting CNL practice is heterogeneous and relatively weak, but includes numerous documented improvements in nationally endorsed patient quality and safety outcomes, care service cost reduction and improved communication and collaboration across disciplines and with patients (Bender 2014). The CNL initiative began in the United States, but is currently expanding internationally as well (Dermody 2015). Despite this promising progress, CNL practice and the mechanisms by which CNL-integration into care delivery leads to reported outcomes are underspecified, with no clear method for measuring CNL practice or the pathways to reported outcomes (Williams & Bender 2015).

Background

To reduce this significant knowledge gap, a recent grounded theory synthesis of existing CNL literature produced a preliminary CNL practice model that helps to better understand the mechanisms of CNL practice (Bender 2016b). The process identified four broad, descriptive domains of CNL practice: 'preparing for CNL practice'; 'structuring the CNL workflow'; 'CNL practice activities'; and 'CNL outcomes'. Furthermore, the synthesis identified continuous clinical leadership as the fundamental practice of CNLs, which includes four core activities: facilitating effective ongoing communication; strengthening intra and interprofessional relationships; building and sustaining teams and supporting staff engagement. These core activities are theorized to shift the microsystem focus away from individual tasks, towards a broader understanding of how everyone plays a part in complex care processes to provide quality patient care. In addition, the synthesis highlighted the complexity involved in planning, implementing and integrating CNL practice into redesigned care delivery models to ensure practice success: CNL practice integration is not merely placing an 'extra set of hands' into a dysfunctional care delivery system with hopes of solving entrenched care problems, but rather a systematic process that requires multilevel organizational input, significant resource allocation and commitment to care delivery redesign from leaders and practitioners across organizational levels to produce consistent care quality and safety outcomes (Bender 2016a, b, Williams *et al.* 2016).

While important, the synthesis provides only a preliminary understanding of CNL-integrated care delivery that was limited by the data sources. The synthesis could not include what was not published; unpublished CNL case studies and narratives that may have unique trajectories and outcomes that could not be included to produce a more comprehensive conceptualization of CNL-integrated care delivery. It is, therefore, important to refine and validate the model across a prospective, broad and comprehensive sample of clinicians and administrators involved in CNL initiatives across the healthcare spectrum. The purpose of this study was to refine and confirm CNL practice domains and better specify fundamental CNL-integrated care delivery components necessary for implementation, practice and outcome success.

The study

Aims

Study aims were to refine and empirically validate a preliminary CNL practice model with a large sample of clinicians and administrators involved in diverse CNL initiatives across the United States. While the CNL initiative is spreading internationally (Dermody 2015), the focus of this study

was CNL initiatives in the United States, where the majority of CNL initiatives are currently active and where experience with CNL practice has been in place the longest.

Design

A sequential mixed methods design was used to achieve study aims, combining initial qualitative (model refinement and survey development) and subsequent quantitative (survey administration and analysis) approaches to obtain multi-modal, corroborative evidence of domains and components encompassing CNL-integrated care delivery (Johnson *et al.* 2007, Palinkas *et al.* 2011).

Sample/participants

The survey targeted the entire population of certified CNLs. CNLs are certified by the accredited Commission on Nurse Certification (CNC) to ensure national level standards for CNL competencies, as delineated in the AACN *Competencies and Curricular Expectations for Clinical Nurse Leader Education and Practice* (AACN 2013). The CNC manages the certified CNL database, which included a population of 3375 CNLs at the time of this study that could be recruited by email invitation. The survey also targeted additional clinicians and administrators involved in a CNL initiative. The size of this population is unknown, so a multi-modal snowball sampling strategy was devised for study recruitment. Publically available emails of eligible participants were obtained through literature review. Poster and presentation abstracts from 2010–2014 national AACN CNL Summits were reviewed to identify authors of published CNL reports. The study survey was also introduced to the CNL community by flyer and announcement at the 2015 CNL Summit in Orlando, Florida. Finally, a statement was included in the recruitment email, inviting recipients to forward study information to clinicians and administrators who might be interested.

Data collection

Model refinement

An expert advisory panel comprising a well-balanced multi-professional team with expertise in CNL policy, education, implementation and practice, and relevant research methods (see acknowledgments for panel members) was convened to refine the preliminary CNL practice model and develop the survey tool. The expert panel coalesced through a process of networking at professional and academic conferences initiated by a shared interest in better specifying the CNL role

in practice and is currently growing and formalizing into a national practice-research collaborative that is described elsewhere (Williams & Bender 2015, Bender 2016c). The investigators and the CNL expert advisory panel used focus group discussion and an iterative Delphi methodology (Hasson *et al.* 2000, Powell 2003) to refine the model domains and components. The refined model clarified components of the four original domains and articulated a temporal domain pathway from 'Readiness' to 'Structuring' to 'Practice' to 'Outcomes'. The refinement process also identified a new domain, 'Administrative/social integration', which had been identified as an important aspect of CNL practice in the preliminary synthesis but had not at that stage coalesced to a formal conceptual domain. The refined CNL practice model included 15 components organized into five domains: 'Readiness for CNL-integrated care delivery', hereafter named 'Readiness'; 'Structuring CNL-integrated care delivery', hereafter named 'Structuring'; 'CNL practice: continuous clinical leadership', hereafter named 'CNL practice'; 'Outcomes of CNL-integrated care delivery', hereafter named 'Outcomes'; and 'Administrative/social integration at the macro-to-micro level'.

CNL practice survey development

The refined model was operationalized via the development of survey items to measure indicators of the components for each of the five domains in the refined CNL Practice Model. A repeated focus group and Delphi process was used to reach consensus on content and verbiage of the 73 model indicators and 16 demographic items. The survey was then pretested with a convenience sample of CNL students (n = 36). The pretest included respondent debriefing items to ascertain the level of understanding of survey item terms and ability to respond to the survey item appropriately; that is, the scale is appropriate to the item (DeMaio *et al.* 1998). Items were revised as indicated by pretest findings and survey content was finalized through consensus obtained using a final Delphi process.

Survey administration

The survey was formatted for electronic administration using the Qualtrics platform. An e-mail containing information about the study and the survey URL link was sent to all known members of the target population in February 2015. E-mail reminders were sent every 3 weeks and the survey closed in May 2015. Participation was voluntary and responses were confidential. Respondents were screened out of the survey if they indicated non-involvement in a CNL initiative, or if their association with a CNL initiative was limited to student status.

Ethical considerations

All appropriate human participants' approvals were obtained before commencing study procedures.

Data analyses

Demographic data were analysed using descriptive statistics to characterize the sample. Operationalization of demographic variables are described elsewhere (Bender *et al.* 2016a,b). Cronbach's alpha coefficients were calculated for first and second-order factor internal consistency and reliability. Confirmatory Factor Analysis (CFA) of survey responses was conducted to test whether survey items were good measures of corresponding components and domains. Structural Equation Modeling (SEM) was conducted to test the structure of the proposed model and the interrelationships between latent constructs and observable variables. Analyses were performed in SPSS v22 and Mplus 7·0.

Validity and reliability/rigour

Focus group and Delphi methodologies are consensus-based research approaches that have been shown to increase construct validity of survey items that are based on an area of uncertainty or which lack empirical evidence (Powell 2003, Okoli & Pawlowski 2004). Accordingly, the refined CNL model is an ideal case for applying such research approaches. The details of the focus group and Delphi process for this study has been described elsewhere (Bender *et al.* 2016a,b) and resulted in a model that had undergone multiple validation steps, including carefully constructed definitions of CNL practice domains and components in collaboration with CNL experts and members of the population of interest and a multilevel approach to model domain and component validation including quantitative evaluation of agreement (Topper *et al.* 1995).

Absolute fit indices were calculated to determine how well the specified model fit the sample data. These included the Chi-Square test (including ratio of Chi-Square value to degrees of freedom), Root Mean Square Error Of Approximation (RMSEA) and Standardized Root Mean Square Residual (SRMR). For SRMR, values of 0·08 or below are acceptable, with values of 0·05 or below considered very well fitting (Hu & Bentler 1999, Hooper *et al.* 2008). An RMSEA of 0·06 or below, with an upper confidence interval of 0·08 or below, is considered good fit (Hu & Bentler 1999, McDonald & Ho 2002, Schreiber *et al.* 2006). With large sample sizes, the SEM chi-square test is often

significant, forcing rejection of the null hypothesis whereby theory and observed data are similar. An acceptable adaptation is the ratio of Chi-Square to degrees of freedom, with a ratio of 5 or less considered a reasonable fit (Wheaton *et al.* 1977, Schreiber *et al.* 2006, Hooper *et al.* 2008). A comparative fit index (CFI) was also calculated, testing the specified model against a null model. Traditionally a CFI value of 0·90 or greater indicates good fit (Hu & Bentler 1999, Hooper *et al.* 2008).

Results

Response rate and descriptive statistics

Information about the study and the survey URL link were emailed to 3873 certified CNLs, managers, leaders and change agents involved in a CNL initiative. An unknown number of people received information about the study via survey flyers and forwarded email recruitment invitations. Nine hundred twenty-one participants entered the CNL survey. There were 104 empty surveys, which were excluded from analysis. We excluded 134 respondents who had no involvement with a CNL initiative and 165 respondents whose only involvement was as a student. Analysis was conducted on 518 survey respondents who identified involvement in a CNL initiative (see Figure 1 for sample response flow chart). A recent study conducted to determine appropriate sample sizes for CFA supported a sample of 518 as adequate for analysis (Myers *et al.* 2011), while Hoe's (2008) literature review concludes that a sample size of >200 for SEM models with high degrees of freedom provides sufficient power for analysis.

The overall certified CNL response rate was 22% of the total population (743/3373); however, only 427 responses met criteria for inclusion in the analysis (Table 1). This response rate is similar to the overall rate (19·1%, 294/1541) that was obtained in a 2011 study that also queried participants from the same certified CNL database (Commission on Nurse Certification 2011) and correlates with findings of another study that compared e-mail vs. post-mail survey response rates for public opinion research, which found an email response rate of 20% (Kaplowitz *et al.* 2004). The population of clinicians/administrators other than certified CNLs involved in CNL initiatives is unknown, so a response rate cannot be calculated. CNL educators comprised 13·7% of the final sample, while managers and executive leaders accountable for CNL roles comprised 15·6% of the sample. Almost half (42·7%) of the final sample identified themselves as CNL preceptors/mentors (Table 1).
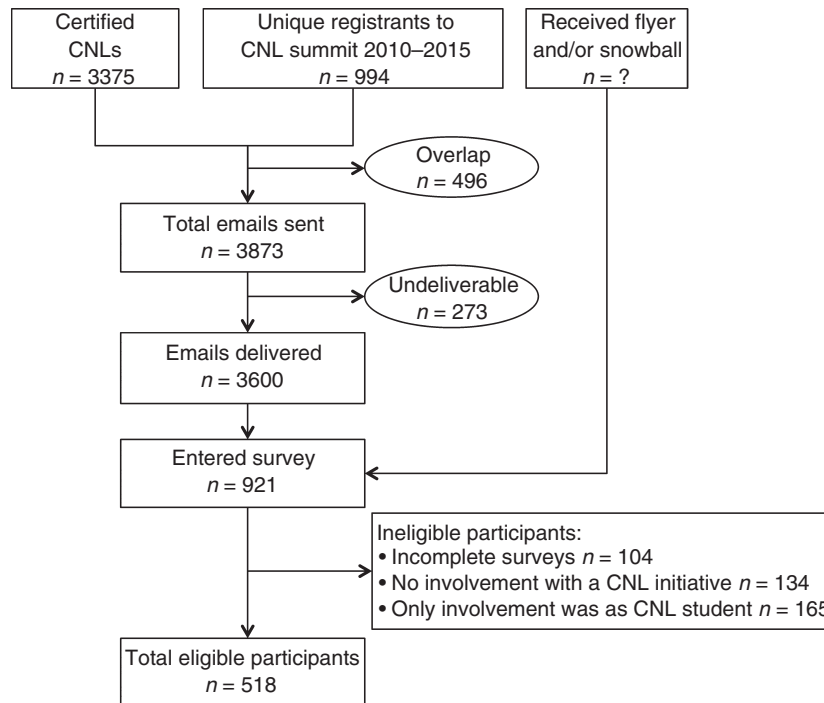
Figure 1 Study sample response flowchart.

Confirmatory factor analysis

Missing responses on one or more items occurred for 59 surveys, with an overall missing rate on all data points of 7%. All responses were within proper value ranges (Table 2). Little's MCAR test was applied to exam the missingness mechanism and no systematic missing pattern was detected (χ^2 (837) = 0·00, P = 1·00). Normality and multicollinearity were investigated before performing the main analysis and no multicollinearity was found. A considerable portion of the variables were found not normally distributed based on skewness and kurtosis values and Shapiro–Wilk test. This issue was handled by specifying the MLM estimator in Mplus for all CFA and SEM analyses. MLM uses maximum likelihood parameter estimates with standard errors and a mean-adjusted chi-square test statistic that are robust to non-normality. (Muthén & Muthén 2012). Therefore, non-normal variables were not transformed.

Cronbach's alpha coefficients were calculated for indicators of each of the five domains and individual components in SPSS 22·0 (Table 2). All second-order factors and most first-order factors demonstrated excellent internal consistency reliability (>0·9) and others showed generally good reliability, with the lowest coefficient being 0·73. Confirmatory factor analysis was used to validate the proposed two-level factor measurement structure: survey items loading on model components (first-order factors) that subsequently load on model domains (second-order factors). A separate CFA was conducted for each of the five model domains. For the final measurement model, all conceptual components and domains had acceptable-to-excellent fit to the data (Table 3).

Structural equation modelling

The CNL practice model was first tested with a full factor measurement structure, that is, all individual items, first-order factors (i.e. components) and second-order factors (i.e. domains) were included. This model was overly complex and did not achieve satisfactory fit. To simplify the model, component scores were computed by averaging across items and individual items were removed from the model. The model was fit without any correlations between indicators, or any other modifications that are not specified in the figure (Figure 2). The refined CNL practice model had adequate goodness-of-fit indexes: χ^2(67) = 154·71, P = 0·000; CFI = 0·95; RMSEA = 0·05 (90% CI: 0·04-0·06); SRMR = 0·05. However, nonsignificant pathways for the 'Administrative/social integration at the macro-to-micro level' domain and lower-than-expected coefficients for this domain's pathways, were noted. Survey items developed to represent this domain were re-examined by the study investigators and after lengthy review and comparison against preliminary model data,

Table 1 Demographics of Survey Participants Involved in a CNL Initiative.

Study participant demographics	Frequency (N = 518)	Per cent (%)
Age		
20-30	50	9·7
31-40	135	26·1
41-50	136	26·3
51-60	151	29·2
>60	46	8·9
Degrees (multiple responses possible)		
Diploma	6	1·2
AA	65	12·5
Bachelor	251	48·5
Master	467	90·2
Doctorate	34	6·6
PhD	32	6·2
Other	2	0·4
Number of years with RN license		
Less than 5 years	37	7·1
5-10 years	109	21·0
11-20 years	153	29·5
Over 20 years	218	42·1
Missing	517	99·8
CNL Certification	427	82·4
Year received CNL certification		
Less than 5 years ago (2011–2015)	263	50·8
5-10 years ago (2005–2010)	164	31·7
Do not have CNL certification	91	17·6
Missing	0	0·0
CNL Model programme graduated from		
Model A (BSN-Master)	277	53·5
Model B (BSN w/residency-Master)	2	0·4
Model C (Second degree programme)	88	17·0
Model D (ADN-Master)	12	2·3
Model E (Post-Master certificate)	13	2·5
Did NOT graduate from a CNL programme	125	24·1
Missing	1	0·2
Additional certification(s) besides CNL	391	75·5
Number of years involved in a CNL initiative		
1-4 years	400	77·2
5-9 years	103	19·8
10 or more years	11	2·1
Missing	4	0·8
Type of involvement (multiple responses possible)		
Practicing in a formal CNL role	346	66·8
A CNL preceptor/mentor in a clinical setting	221	42·7
Developing the CNL initiative	177	34·2
An instructor in a CNL educational programme	71	13·7
Manager/director with formal CNL accountability	58	11·2
Executive leader with formal CNL accountability	23	4·4
Other	39	7·5

Table 1 (*Continued*).

Study participant demographics	Frequency (N = 518)	Per cent (%)
Phase of CNL initiative involved with (multiple responses possible)		
The development of the strategic plan for the CNL initiative	174	33·6
Educating CNLs for direct placement into a CNL role	144	27·8
A CNL feasibility pilot	76	14·7
The initial implementation of CNL practice	296	57·1
After the CNL was established	199	38·4
Formative or summative evaluation of CNL practice	113	21·8
Other	12	2·3
CNL initiative setting		
Acute care hospital	408	78·8
Multiple settings within one health system	33	6·4
Academic/education institution	30	5·8
Ambulatory clinic	23	4·4
Short/long term acute care facility	8	1·5
Other	16	3·1
N/A	0	0·0
Missing	0	0·0
CNL initiative setting designations (multiple responses possible)		
No current designations	293	56·6
Magnet status	184	35·5
Other designation	110	21·2
N/A	13	2·5
CNL initiative setting association with academic institution		
Yes	357	68·9
No	149	28·8
N/A	2	0·4
Don't know	10	1·9
Missing	0	0·0
CNL initiative setting location		
Urban (catchment area of 50,000 people or more)	435	84·0
Rural (catchment area less than 50,000 people)	57	11·0
Other	22	4·2
N/A	3	0·6
Missing	1	0·2
CNL initiative setting region		
Northeast	76	14·7
Midwest	141	27·2
South	219	42·3
West	80	15·4
N/A	0	0·0
Missing	1	0·2
CNL initiative setting ownership status		
Not for profit (non-government)	297	57·3
Federal government	143	27·6
Non-federal government	17	3·3
For profit	43	8·3
Other	16	3·1

Table 1 (Continued).

Study participant demographics	Frequency (N = 518)	Per cent (%)
N/A	2	0·4
Missing	0	0·0
Phase CNL initiative setting is in		
The CNL initiative has spread to a majority of units/settings within my facility	178	34·4
The CNL initiative has spread to a few, but not a majority, of units/settings within my facility	156	30·1
The CNL initiative was/is limited to one unit/setting within my facility	64	12·4
The CNL initiative was/is in pilot stage	42	8·1
The CNL initiative was planned but did not move forward to pilot or implementation stage	23	4·4
The CNL initiative was piloted and/ or implemented and then stopped	32	6·2
Don't know	20	3·9
Missing	3	0·6

determined to reflect the phase of CNL integration when administrative and clinical staff value CNL-integrated care delivery - an important indicator of success. This process resulted in re-conceptualization of relevant survey items into a new domain of Value, which occurs after CNL practice has been implemented and outcomes achieved.

Based on this post hoc analysis, the model was re-specified and re-analysed.

The structure of the re-specified, final model was more parsimonious while maintaining good fit indices: $\chi^2(62) = 173\cdot54$, $P < 0\cdot001$ (ratio χ^2/d.f. = 2·8); CFI = 0·92; RMSEA = 0·06 (90% CI: 0·05-0·07); SRMR = 0·07 (Figure 2). The unstandardized and standardized path estimates for the re-specified final model are presented in Table 4. The final model pathway had large and significant path coefficients, from 'Readiness' to 'Value', confirming hypothesized relationships. 'Readiness' responses explained 37% of the variance in the 'Structuring' responses; 'Readiness' and 'Structuring' responses explained 90% of the variance in 'CNL Practice' responses; 'Readiness', 'Structuring' and 'CNL Practice' responses explained 65% of the variance in 'Outcomes' responses; and 'Readiness', 'Structuring', 'CNL Practice' and 'Outcomes' explained 34% of the variance in 'Value' responses.

Discussion

This study refined and then validated a conceptual, explanatory pathway of CNL-integrated care delivery that starts with ensuring organizational readiness for change, identifies critical structuring elements of CNL-integrated care delivery, delineates the CNL-specific practices that are hypothesized mechanisms of action for achieving improved care environments and patient outcomes and highlights the

Table 2 Descriptive statistics and Chronbach's alpha for measured variables.

Domain/component variable	Label*	#Items	Range	Minimum	Maximum	Mean	SD	Chronbach's alpha
Readiness for CNL-integrated care delivery								0·93
Understand care delivery gaps	C1	4	0-100	3·25	100·00	88·34	15·14	0·85
Consensus CNL practice can close gaps	C2	4	0-100	5·00	100·00	84·90	17·90	0·81
Organization level implementation strategy	C3	6	0-100	6·17	100·00	87·03	18·45	0·90
Structuring CNL-integrated care delivery								0·92
Microsystem level structuring	C4	5	0-100	7·20	100·00	88·07	13·95	0·73
CNL-level competency structuring	C5	11	0-100	2·91	100·00	93·95	9·56	0·082
CNL-level workflow structuring	C6	3	0-100	6·33	100·00	94·11	11·21	0·84
CNL practice: continuous clinical leadership								0·96
Facilitate effective ongoing communication	C7	6	0-100	2·00	100·00	92·27	12·00	0·90
Strengthen intra and interprofessional relationships	C8	4	0-100	1·75	100·00	94·80	11·33	0·95
Create and sustain teams	C9	4	0-100	5·00	100·00	94·15	11·03	0·91
Support staff engagement	C10	5	0-100	6·00	100·00	94·46	10·21	0·91
Outcomes of CNL-integrated care delivery								0·96
Improved care environments	C11	7	0-100	6·57	100·00	94·44	10·90	0·94
Improved care quality outcomes	C12	7	0-100	4·57	100·00	94·72	10·55	0·93
Value	–	4	0-100	0·00	100·00	94·85	11·45	0·94

*Corresponds with labels in Figure.

Table 3 Confirmatory factor analysis of model domains and components.

Domain and component	Survey item	First-order factor loading (Component)	Second-order factor loading (Domain)	CFA fit statistics
Domain 1: Readiness for CNL-integrated care delivery				
(C1) Understand care delivery gaps	Nursing executives/managers understand that nursing care delivery influences quality of care	0·85	0·65	$\chi^2(71) = 259·12$,
	Point of care staff understand that nursing care delivery influences quality of care	0·80		$P < 0·001$
	Nursing executives/managers are aware that gaps in quality may be partially related to how nursing care is organized	0·82		ratio χ^2/d.f. = 3·65 RMSEA = 0·08
	Point of care staff are aware that gaps in quality may be partially related to how nursing care is organized	0·81		(0·07-0·09) CFI = 0·91
(C2) Consensus CNL practice can close gaps	Nurse executives/managers believe CNL education and competencies can influence care quality	0·57	1·00*	SRMR = 0·09
	Point of care staff believe CNL education and competencies can influence care quality	0·54		
	Nurse executives/managers understand care delivery needs to be reorganized to include CNL practice	0·85		
	Point of care staff understand care delivery needs to be reorganized to include CNL practice	0·82		
(C3) Organization level implementation strategy	There is a global strategic plan to re-organize nursing care delivery to include CNL practice	0·85	0·89	
	There is an appropriate change-management strategy selected to implement CNL practice	0·88		
	There is a team made accountable for CNL implementation	0·85		
	This team should include members from the executive, manager and point of care levels	0·70		
	Nurse executives/leaders commit adequate resources to CNL implementation	0·88		
	There is a shared vision for CNL practice at the executive, department and point of care level	0·38		

Table 3 (*Continued*).

Domain and component	Survey item	First-order factor loading (Component)	Second-order factor loading (Domain)	CFA fit statistics
Domain 2: Structuring CNL-integrated care delivery				$\chi^2(149) = 333.02$, $P < 0.001$ ratio χ^2/ d.f. = 2.24 RMSEA = 0.05 (0.04-0.06) CFI = 0.90 SRMR = 0.06
(C4) Microsystem level structuring	The nurse-staffing model is reorganized to integrate CNL practice	0.58	0.91	
	CNL practice involves minimal administrative management duties	0.51		
	The CNL is consistently present at the point of care (i.e. where the patients are)	0.59		
	CNL practice is aligned with front line clinical care delivery needs	0.67		
	CNL practice is aligned with executive quality and safety priorities	0.68		
(C5) CNL-level competency structuring	Background for CNL practice includes education in both science and humanities	0.60	0.81	
	CNLs use organizational and systems leadership theories to frame clinical practice	0.66		
	CNLs assess the clinical environment as the basis for identifying issues with care processes	0.82		
	CNLs implement quality improvement strategies using current evidence, analytics, and risk anticipation	0.85		
	CNLs facilitate the integration of evidence into practice	0.86		
	CNLs use informatics and technology to support and improve care processes/health outcomes	0.74		
	CNLs advocate for policies that improve care processes/health outcomes	0.83		
	CNLs facilitate inter-professional collaboration to improve care processes/health outcomes	0.79		
	CNLs create comprehensive care plans/guidelines that address patient population needs	0.66		
	CNLs demonstrate Master's level nursing practice	0.82		
	CNLs organize patient care to facilitate appropriate care delivery	0.67		
(C6) CNL-level workflow structuring	CNLs assess the clinical environment to identify areas for outcomes improvement	0.87	0.89	
	CNLs collect, analyse and use data to improve clinical outcomes	0.85		
	CNLs are accountable for a set of point of care clinical outcomes	0.71		

Table 3 (*Continued*).

Domain and component	Survey item	First-order factor loading (Component)	Second-order factor loading (Domain)	CFA fit statistics
Domain 3: CNL Practice: Continuous clinical leadership				
(C7) Facilitate effective ongoing communication	The CNL facilitates communication between nurses, patients and other professions at the point of care	0.81	0.93	$\chi^2(148) = 334.79$, $P < 0.001$ ratio χ^2/d.f. = 2.26 RMSEA = 0.05 (0.04-0.06) CFI = 0.94 SRMR = 0.05
	The CNL is a communication 'hub' between multi-professional clinicians and patients at the point of care	0.82		
	The CNL facilitates multi-professional communication to gather clinical information	0.87		
	The CNL creates communication tools, such as electronic databases or care guidelines	0.66		
	The CNL facilitates effective ways to communicate information to all point of care multi-professional clinicians	0.83		
	The CNL facilitates/develops effective and meaningful nursing and inter-professional rounds	0.75		
(C8) Strengthen intra and inter-professional relationships	The CNL reaches out to all multi-professional clinicians at the point of care	0.85	0.93	
	The CNL builds relationships with everyone who supports the patient	0.94		
	The CNL builds relationships with all multi-professional clinicians involved with patient care	0.95		
	The CNL creates interactive relationships between professions	0.92		
(C9) Create and sustain teams	The CNL identifies all participants involved in a point of care process	0.81	0.72	
	The CNL builds teams to improve care processes	0.91		
	The CNL brings people together from all the disciplines and departments affected by a care process to work together to improve the process	0.90		
	The CNL is a resource for teamwork	0.80		
(C10) Support staff engagement	The CNL provides ongoing support for staff to lead their own practice	0.82	0.78	
	The CNL is a consistently present role model for all staff working at the point of care	0.84		
	The CNL is a responsive/available resource to staff based on their needs at the moment	0.75		
	The CNL helps staff identify and create solutions for patient care needs	0.89		
	The CNL empowers staff nurses to perform to their full scope of practice	0.86		

Table 3 (*Continued*).

Domain and component	Survey item	First-order factor loading (Component)	Second-order factor loading (Domain)	CFA fit statistics
Domain 4: Outcomes of CNL-integrated care delivery				
(C11) Improved care environments	There are effective communication processes across professions	0.87	–	$\chi^2(76) = 180.87$, $P < 0.001$ ratio χ^2/d.f. = 2.38 RMSEA = 0.05 (0.04–0.06) CFI = 0.92 SRMR = 0.04
	Staff feel like they own their practice	0.76		
	Staff are more satisfied with the care environment	0.81		
	Multi-professional clinicians regularly collaborate to plan patient care	0.93		
	Physicians are more satisfied with the care their patients receive	0.87		
	Multi-professional clinicians regularly work together to solve clinical problems	0.95		
	CNL practice changes the dynamics of clinical interactions between multi-professional clinicians for the better	0.57		
(C12) Improved care quality outcomes	Patients and families experience improved care coordination	0.85	–	
	There are improvements in point of care nursing sensitive care quality indicators	0.90		
	There is improvement in national quality benchmark outcomes	0.85		
	There is improved care coordination	0.91		
	There are less gaps or 'omissions' in care	0.85		
	Errors are prevented/caught before they reach the patient	0.76		
	Staff spend more time with patients	0.66		
Domain 5: value				
	CNL practice is valued by executive leaders	0.86	–	$\chi^2(2) = 1.12$, $P = 0.571$; RMSEA = 0.00 (0.00–0.08) CFI = 1.00 SRMR = 0.01
	CNL practice is valued by point of care/department managers	0.93		
	CNL practice is valued by point of care staff	0.84		
	CNL practice is valued by point of care multi-professional clinicians	0.92		

*Factor loadings were fixed to one due to non-significant negative variances. Second-order factors were not modelled for domains with less than three components.
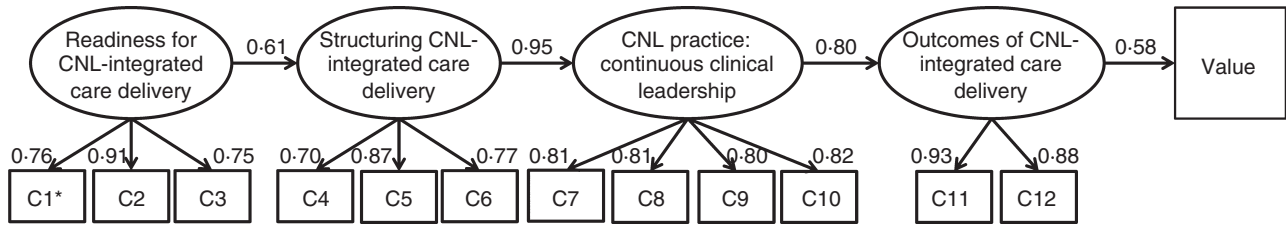
Figure 2 Final Model. *Corresponds with component.

Table 4 Maximum Likelihood estimates of the final model.

Path	Unstandardized estimate	Standardized estimate	Standard error	Z value	P value
Direct pathways					
Readiness → Structuring	0·49	0·61	0·06	10·39	<0·001
Structuring → Leadership	0·97	0·95	0·02	42·11	<0·001
Leadership → Outcome	0·79	0·80	0·06	12·36	<0·001
Outcome → Value	0·69	0·58	0·10	5·56	<0·001
Indirect pathways					
Readiness → Structuring → Leadership → Outcome → Value	0·26	0·27	0·09	2·98	0·003
Structuring → Leadership → Outcome → Value	0·53	0·44	0·11	3·89	<0·001
Leadership → Outcome → Value	0·54	0·46	0·11	4·08	<0·001
Readiness → Structuring → Leadership → Outcome	0·37	0·46	0·08	5·77	<0·001
Structuring → Leadership → Outcome	0·77	0·76	0·07	10·64	<0·001

value of CNL practice as perceived by clinicians and administrators as an important overall indicator of CNL success. The following sections discuss the refined and validated model domains and relationships in more detail.

Domain 1: readiness For CNL-integrated care delivery

Readiness includes acknowledgement of care delivery gaps by health system clinicians and leaders/managers and subsequent consensus that CNL education and competencies have the potential to close these gaps. Readiness also involves the development of an implementation strategy, based on this acknowledgement, that is capable of preparing the environment for change. It is not surprising that organizational readiness was validated in this study as the first step towards successful CNL-integrated care delivery. Readiness for change is a complex multifaceted construct, incorporating individual and organizational factors (Helfrich *et al.* 2009, Holt *et al.* 2010). Readiness for change has been identified as a critical component of successful change projects, although currently there are no identified 'best practices' to increase readiness for change (Weiner 2009). It is important to note, however, that highlighting the discrepancy between current and desired performance levels and creating a vision of a better future state, such as identified in this study, may increase organizational

readiness for change (Weiner 2009). The 'Readiness' domain was in fact highly associated with the 'Structuring' domain ($\beta = 0.61$), with 37% of the variance in 'Structuring' domain responses accounted for by 'Readiness'. This suggests appropriate structuring of CNL-integrated care delivery is contingent on a health system's readiness for change, which includes belief in CNL practice and appropriate deployment of resources to integrate CNLs into care delivery structures.

Domain 2: structuring CNL-integrated care delivery

Structuring includes the re-design of microsystem level care delivery to incorporate a consistent, competency-based CNL workflow. Care delivery redesign includes the alignment of CNL workflow with care delivery needs and quality priorities and a consistent CNL presence at the care delivery microsystem. A competency-based workflow means that CNLs have accountability for all nine CNL essentials of competence, as delineated in the AACN *Competencies and Curricular Expectations for Clinical Nurse Leader Education and Practice* (AACN 2013). Two of these competencies are general to Masters level nursing degrees: education in both science and humanities; and Master's level nursing practice. The remaining competencies advance knowledge, skills and abilities in clinical leadership, care environment

management and clinical outcomes management, which were developed to directly and positively impact care delivery (Sherman *et al*. 2009). These include: assess the clinical environment as the basis for identifying issues with care processes; facilitate inter-professional collaboration to improve care processes/health outcomes; use organizational and systems leadership theories to frame clinical practice; implement quality improvement strategies using current evidence, analytics and risk anticipation; and lateral integration of patient care to facilitate quality and safe care delivery.

The 'Structuring' domain is strongly associated with the 'CNL Practice' domain (β = 0·95), with 'Readiness' and 'Structuring' responses together accounting for 90% of the variance in 'CNL Practice' domain responses. This suggests successful CNL practice cannot be achieved without a health system's multi-level belief in CNL practice to close care delivery gaps, appropriate deployment of resources to integrate CNLs into care delivery structures and the redesign of the care delivery model to integrate a CNL workflow that focuses on clinical leadership and care environment and clinical outcomes management.

Domain 3: CNL practice: continuous clinical leadership

CNL practice was validated in this study as an ongoing process of continuous clinical leadership, whereby CNLs continuously enact four core practices: (1) facilitate effective ongoing communication, including the creation of multi-modal communication tools and rounding structures; (2) strengthen intra and inter-professional relationships by establishing a network of multi-professional microsystem partners who previously worked in isolation; (3) create and sustain teams by bringing people from all disciplines and departments affected by care processes to work together and improve them; and (4) support staff engagement via an ongoing, consistent supportive presence, the provision of resources based on in-the-moment needs and empowering staff to perform to their full scope of practice and identify and create solutions for patient care needs. It is important to note that data from this study confirmed that CNL practice is more complex than an independent role based on CNL competencies placed in a clinical microsystem. Rather, competencies are considered necessary structuring elements that enable the enactment of interdependent, relational continuous clinical leadership practices by CNLs at the microsystem level. The distinction is important because it highlights CNL clinical 'embeddedness' as a fundamental aspect of practice.

Clinical leadership has been described in the literature as a complex process of managing relationships at the microsystem level to facilitate the restructuring of multi-relational care delivery processes to improve care quality and has been conceived as a new model of behaviour that requires sustained effort and appropriate and supportive infrastructure to become embedded, or acculturated, into everyday practice (Millward & Bryan 2005, Fealy *et al*. 2011, Howieson & Thiagarajah 2011, Willcocks 2011, Leggat & Balding 2013, Mannix *et al*. 2013, Daly *et al*. 2014). This study validated a conceptualization of CNL practice as the continuous enactment of four relational clinical leadership practices – communication, interprofessional relationship building, team building and supporting staff engagement – that are proposed as the dynamic mechanism by which outcomes are achieved. Furthermore, these practices require adequate structuring – care delivery redesign, a consistent, competency-based CNL workflow – to be effectively and consistently manifested.

Domain 4: outcomes of CNL-integrated care delivery

The 'outcomes' domain, including both improved care environments and improved care quality, was strongly and positively associated with the 'CNL practice' domain (β = 0·80), suggesting that CNL practice plays a significant role in care outcome improvements. The indirect pathway from 'Structuring' to 'Outcomes' was β = 0·76. This supports the hypothesis that appropriate structuring is necessary for CNL practice to produce expected outcomes. Validated elements of improved care environments included effective communication processes across professions, staff perceptions of owning their own practice, a perception that multiprofessional clinicians regularly work together to solve clinical problems, a perception that CNL practice changes the dynamics of clinical interactions between multi-professional clinicians for the better and overall satisfaction with the care environment. Validated elements of improved care quality include improvements in nursing sensitive care quality indicators, better care coordination, less gaps or omissions in care, prevention of errors before reaching the patient and staff spending more time with patients. These outcomes are directly related to the aims and priorities of The National Quality Strategy (http://www.ahrq.gov/workingforquality/about.htm#aims) and are represented as critical metrics of both the Institute of Medicine (2015) and the National Quality Forum (https://www.qualitymeasures.ahrq.gov/).

Domain 5: value

Finally, the 'Value' domain, where point-of-care multi-professional clinicians and multi-level leaders and administrators perceive CNL-integrated care delivery as adding value to the way care is delivered, is significantly associated with the 'Outcomes' domain ($\beta = 0.58$). The indirect path coefficient from 'Readiness' domain to 'Value' domain was $\beta = 0.27$ and from 'Structuring' domain to 'Value' domain was $\beta = 0.44$. We hypothesize that the relative weakness of the indirect pathways to 'Value' found in this cross-sectional model analysis is actually much stronger in the dynamic reality of successful CNL-integrated practice. For example, the 'Value' domain of CNL-integrated care delivery may 'feedback' into the 'Readiness', 'Structuring' and 'CNL Practice' domains in a positive feedback cycle that over time strengthens and sustains CNL-integrated care delivery and positive outcomes. Conversely, where low levels of 'Readiness' are present, or if 'CNL practice' does not have appropriate 'Structuring', then 'Outcomes' and subsequent 'Value' may not be achieved, potentially resulting in a negative feedback cycle that thwarts CNL-integrated care delivery and leads to its dissolution; for example, as a failed CNL pilot. Future research is warranted to further specify the 'Value' domain and examine its influence on CNL-integrated care delivery.

Limitations

In addition to direct recruitment from the known population of CNLs, this study used snowball sampling to recruit clinicians and leaders involved in CNL initiatives for which the population size is unknown. Therefore, we are unable to determine the denominator of the full sample/population ratio for this group, which limits determination of the representativeness of the study sample. Heterogeneity of care delivery systems represented by the sample also introduces the potential for different interpretations of survey items based on the nature of the CNL initiative and the context within which each initiative was implemented. Finally, the validated model does not provide actual evidence of the effectiveness of CNL-integrated care delivery. However, the validated model in this study links contextual 'Readiness' and 'Structuring' domains with 'CNL Practice' and 'Outcomes' domains in a causal pathway that begins to explain CNL mechanisms of action. The believability and credibility of the model obtained with the expert panel and the diverse survey sample of participants in CNL initiatives provides common ground for further research that includes measuring and comparing CNL structuring and practice in

a standardized way across diverse care settings and linking CNL practice to patient quality and safety outcomes.

Conclusion

This study validated a parsimonious theoretical and measurement model of CNL-integrated care delivery. A mixed methods design was used to refine a preliminary model for CNL practice, which incorporated a lengthy process of revision and consensus building across a multi-professional CNL expert panel with diverse perspectives of CNL practice. The refined model was then used to develop survey items corresponding to model domains and components. All survey items went through a similar refinement and consensus process with the CNL expert panel. The survey was then administered to a diverse sample of clinicians, administrators, leaders and educators involved in CNL initiatives across the nation. Analysis of responses confirmed the survey measurement model and hypothesized model structure. However, the SEM analysis highlighted the complexity of the refined model structure and the insignificant pathways for one model domain: 'Administrative/social integration at the macro-to-micro level'. *Post hoc* review of the domain resulted in a key theoretical insight: an important overall outcome of CNL integration into practice is its perceived value by both clinicians at the point of care and administrators and/or leaders at all levels of the organization. This theoretical insight was incorporated into a re-specified model, which resulted in a final model structure with good fit across all hypothesized pathways. In fact, the respecified 'Value' domain had the best CFA factor loading of all domains, validating this important change in the structure and measurement model.

Implications

The National Academy of Medicine, the Agency for HealthCare Research and Quality (AHRQ) and the Robert Wood Johnson Foundation have all identified CNL-integrated care delivery as an innovation with the potential to meet higher healthcare quality standards (Joynt & Kimball 2008, AHRQ 2010, Institute of Medicine 2011). While numerous case and cross-sectional studies have shown the capacity of CNL practice to improve care environments and quality outcomes, what has been lacking until now is conceptual clarity about what CNL practice entails, how it should be integrated into care delivery and the mechanisms of action by which CNL practice contributes to improved care outcomes. This study has validated a CNL practice model that significantly closes this conceptual knowledge

gap and has produced a survey tool that is capable of measuring CNL implementation and practice in a standardized way across health systems that have integrated CNLs into their care delivery models and linking that practice to improvements in patient quality outcomes. Comparison of CNL implementation and practice across health settings, using the validated instrument in part for measurement purposes, will also advance understanding of: (a) context-specific CNL administrative and clinical implementation and structuring components; (b) the specific influence of implementation and structuring domains on CNL practice success; and (c) effective practice patterns comprising CNL role enactment. As the model is tested in diverse health systems across the nation, synthesis of multi-site CNL implementation, practice and outcomes data can identify domain 'clusters' that are most highly correlated with CNL practice effectiveness in terms of outcomes and perceived value.

This research will provide a robust yet flexible evidence base that can be taken up by diverse care settings across the healthcare spectrum. This is important for the nursing profession because while there is currently robust evidence that the *presence* of nurses at the frontlines of hospital care reduces patient mortality and morbidity (Aiken *et al.* 2011, Needleman *et al.* 2011, Needleman 2015), a recent Cochrane review concluded that there is as yet no strong evidence favouring any *nursing care model* investigated, such as primary or team nursing (Butler *et al.* 2011). It is important to fill this significant knowledge gap and generate theory and evidence for approaches to organizing nursing knowledge and practice into care delivery models that can ensure consistent positive patient outcomes, thereby empirically demonstrating the impact and value of nursing on healthcare quality and safety.

Conflict of interest

The authors have no conflicts of interest to disclose.

Author contributions

All four authors declare the following to be true:

- Substantial contribution to conception and design, or acquisition of data, or analysis and interpretation of data;
- Drafting the article or revising it critically for important intellectual content and;
- Final approval of the version to be published.

References

Agency for Healthcare Research and Quality (2010) Clinical Nurse Leader as Quality Champion: A Dialogue About an Effective Nursing Innovation. Retrieved from https://innovations.ahrq.gov/events/2010/01/clinical-nurse-leader-quality-champion-dialogue-about-effective-nursing-innovation on 2 January 2016.

Aiken L.H., Cimiotti J.P., Sloane D.M., Smith H.L., Flynn L. & Neff D.F. (2011) Effects of nurse staffing and nurse education on patient deaths in hospitals with different nurse work environments. *Medical Care* **49**(12), 1047–53.

American Association of Colleges of Nursing (2007) *White paper on the education and role of the clinical nurse leader*. Retrieved from http://aacn.nche.edu/publications/whitepapers/clinicalnurseleader07.pdf on 21 September 2015.

American Association of Colleges of Nursing (2013) Competencies and curricular expectations for clinical nurse leader education and practice. Retrieved from http://www.aacn.nche.edu/cnl/CNL-Competencies-October-2013.pdf on 25 September 2015.

Bender M. (2014) The current evidence base for the clinical nurse leader: a narrative review of the literature. *Journal of Professional Nursing* **30**(2), 110–123.

Bender M. (2016a) Clinical Nurse Leader Integration Into Practice: Developing Theory To Guide Best Practice. *Journal of Professional Nursing* **32**(1), 32–40.

Bender M. (2016b) Conceptualizing clinical nurse leader practice: an interpretive synthesis. *Journal of Nursing Management* **24**(1), E23–E31.

Bender M. (2016c) A National Clinical Nurse Leader Stakeholder Engaged Research Collaborative. Symposium Presented at the

Western Institute of Nursing Annual Conference, April 7-9, Anaheim, CA.

Bender M., Williams M., Su W. & Hites L. (2016a) Clinical Nurse Leader integrated care delivery to improve care quality and safety: factors influencing perceived success. *Journal of Nursing Scholarship* **48**(4), 414–422.

Bender M., Williams M. & Su W. (2016b) Diffusion of a Nurse-led Healthcare Innovation: Describing Certified Clinical Nurse Leader™ Integration into Care Delivery. *Journal of Nursing Administration* **46**(7/8), 400–407.

Butler M., Collins R., Drennan J., Halligan P., O'Mathúna D.P., Schultz T.J., Sheridan A. & Vilis E. (2011) Hospital nurse staffing models and patient and staff related outcomes. *Cochrane Database of Systematic Reviews*, 7, CD007019.

Commission on Nurse Certification (2011) *Clinical Nurse Leader Job Analysis Report*. Retrieved from http://www.aacn.nche.edu/cnl/Job-Analysis-Report.pdf on 25 September 2015.

Daly J., Jackson D., Mannix J., Davidson P.M. & Hutchinson M. (2014) The importance of clinical leadership in the hospital setting. *Journal of Healthcare Leadership* **6**, 75–83.

DeMaio T. J., Rothgeb J. & Hess J. (1998) Improving survey quality through pretesting. Proceedings of the Section on Survey Research Methods, American Statistical Association, Vol. 3, pp. 50–58.

Dermody G. (2015) Fostering the Integration of the Clinical Nurse Leader Role in Japan through a Multidisciplinary Clinical Immersion Program in the United States. 43rd Biennial Convention (07 November-11 November 2015). Sigma Theta Tau International.

Fealy G.M., McNamara M.S., Casey M., Geraghty R., Butler M., Halligan P., Treacy M. & Johnson M. (2011) Barriers to clinical leadership development: findings from a national survey. *Journal of Clinical Nursing* **20**(13–14), 2023–2032.

Hasson F., Keeney S. & McKenna H. (2000) Research guidelines for the Delphi survey technique. Journal of advanced nursing. *Journal of Advanced Nursing* **32**(4), 1008–1015.

Helfrich C.D., Li Y.F., Sharp N.D. & Sales A.E. (2009) Organizational readiness to change assessment (ORCA): development of an instrument based on the Promoting Action on Research in Health Services (PARIHS) framework. *Implementation Science* **4**(1), 1.

Hoe S.L. (2008) Issues and procedures in adopting structural equation modeling technique. *Journal of Applied Quantitative Methods* **3**(1), 76–83.

Holt D.T., Helfrich C.D., Hall C.G. & Weiner B.J. (2010) Are you ready? How health professionals can comprehensively conceptualize readiness for change. *Journal of General Internal Medicine* **25**(S1), 50–55.

Hooper D., Coughlan J. & Mullen M. (2008) Structural equation modelling: guidelines for determining model fit. *Electronic Journal of Business Research Methods* **6**(1), 53–60.

Howieson B. & Thiagarajah T. (2011) What is clinical leadership? A journal-based meta-review. *The International Journal of Clinical Leadership* **17**(1), 7–18.

Hu L.T. & Bentler P.M. (1999) Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal* **6**(1), 1–55.

Institute of Medicine (2011) *The Future of Nursing: Leading Change, Advancing Health* National Academies Press, Washington DC.

Institute of Medicine (2015) *Vital Signs: Core Metrics for Health and Health Care Progress* National Academies Press, Washington, DC.

Johnson R.B., Onwuegbuzie A.J. & Turner L.A. (2007) Toward a definition of mixed methods research. *Journal of Mixed Methods Research* **1**(2), 112–133.

Joynt J. & Kimball B. (2008) Innovative care delivery models: identifying new models that effectively leverage nurses. *Health Workforce Solutions*. Retrieved from http://www.innovativecaremodels.com/docs/HWS-RWJF-CDM-White-Paper.pdf on 25 September 2015.

Kaplowitz M.D., Hadlock T.D. & Levine R. (2004) A comparison of web and mail survey response rates. *Public Opinion Quarterly* **68**(1), 94–101. doi:10.1093/poq/nfh006

Leggat G.S. & Balding C. (2013) Achieving organisational competence for clinical leadership: the role of high performance work systems. *Journal of Health Organization and Management* **27**(3), 312–329.

Mannix J., Wilkes L. & Daly J. (2013) Attributes of clinical leadership in contemporary nursing: an integrative review. *Contemporary Nurse* **45**(1), 10–21.

McDonald R.P. & Ho M.-H.R. (2002) Principles and practice in reporting structural equation analyses. *Psychological Methods* **7**(1), 64–82.

Millward L.J. & Bryan K. (2005) Clinical leadership in health care: a position statement. *International Journal of Health Care Quality Assurance*, **18**(2/3), xiii–xxv.

Muthén L.K. & Muthén B.O. (2012) *The Comprehensive Modelling Program for Applied Researchers: User's Guide.* MPlus 5, Los Angeles, CA.

Myers N.D., Ahn S. & Jin Y. (2011) Sample size and power estimates for a confirmatory factor analytic model in exercise and sport. *Research Quarterly for Exercise and Sport* **82**(3), 412–423.

Needleman J. (2015) Nurse staffing: the knowns and unknowns. *Nursing Economics* **33**(1), 5–7.

Needleman J., Buerhaus P., Pankratz V.S., Leibson C.L., Stevens S.R. & Harris M. (2011) Nurse staffing and inpatient hospital mortality. *The New England Journal of Medicine* **364**(11), 1037–45.

Okoli C. & Pawlowski S.D. (2004) The Delphi method as a research tool: an example, design considerations and applications. *Information and Management* **42**(1), 15–29.

Palinkas L.A., Aarons G.A., Horwitz S., Chamberlain P., Hurlburt M. & Landsverk J. (2011) Mixed method designs in implementation research. *Administration and Policy in Mental Health* **38**(1), 44–53.

Powell C. (2003) The Delphi technique: myths and realities. *Journal of Advanced Nursing* **000**, 000–000.

Schreiber J.B., Nora A., Stage F.K., Barlow E.A. & King J. (2006) Reporting structural equation modeling and confirmatory factor analysis results: a review. *The Journal of Educational Research* **99**(6), 323–338.

Sherman R.O., Edwards B., Giovengo K. & Hilton N. (2009) The role of the clinical nurse leader in promoting a healthy work

environment at the unit level. *Critical Care Nursing Quarterly* **32**(4), 264–271.

Topper M., Emmelkamp P.M.G., Watkins E. & Ehring T. (1995) Content validity in psychological assessment: a functional approach to concepts and methods. *British Journal of Clinical Psychology* **7**(3), 238–247.

Weiner B.J. (2009) A theory of organizational readiness for change. *Implementation Science* **4**(1), 67.

Wheaton B., Muthen B., Alwin D.F. & Summers G.F. (1977) Assessing reliability and stability in panel models. *Sociological Methodology* **8**(1), 84–136.

Willcocks S. (2011) Identifying clinical leadership functions. *British Journal of Healthcare Management* **17**(3), 96–100.

Williams M. & Bender M. (2015) Growing and Sustaining the Clinical Nurse Leader Initiative: Shifting the Focus From Pioneering Innovation to Evidence-Driven Integration Into Healthcare Delivery. *Journal of Nursing Administration* **45**(11), 540–543.

Williams M., Avolio A.E., Ott K.M. & Miltner R.S. (2016) Promoting a strategic approach to clinical nurse leader practice integration. *Nursing Administration Quarterly* **40**(1), 24–32. doi:10.1097/NAQ.0000000000000143