

Title

The Impact of Nursing Rounds on the Practice Environment and Nurse Satisfaction in Intensive Care: pre-test post-test comparative study

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Abstract

Background: Factors previously shown to influence patient care include effective decision making, team work, evidence based practice, staffing and job satisfaction.

Clinical rounds have the potential to optimise these factors and impact on patient outcomes, but use of this strategy by intensive care nurses has not been reported.

Objectives: To determine the effect of implementing Nursing Rounds in the intensive care environment on patient care planning and nurses' perceptions of the practice environment and work satisfaction.

Design: Pre-test post-test 2 group comparative design

Settings: Two intensive care units in tertiary teaching hospitals in Australia.

Participants: A convenience sample of registered nurses (n=244) working full time or part time in the participating intensive care units.

Methods: Nurses in participating intensive care units were asked to complete the Practice Environment Scale - Nursing Work Index (PES-NWI) and the Nursing Worklife Satisfaction Scale (NWSS) prior to and after a 12 month period during which regular Nursing Rounds were conducted in the intervention unit. Issues raised during Nursing Rounds were described and categorised. The characteristics of the sample and scale scores were summarised with differences between pre and post scores analysed using t-tests for continuous variables and chi-square tests for categorical variables. Independent predictors of the PES-NWI were determined using multivariate linear regression.

Results: Nursing Rounds resulted in 577 changes being initiated for 171 patients reviewed; these changes related to the physical, psychological – individual, psychological – family, communication or professional practice aspects of care. Total PES-NWI and NWSS scores were similar before and after the study period in both

participating units. The NWSS sub-scale of interaction between nurses improved in the intervention unit during the study period (pre – 4.85 ± 0.93 ; post – 5.36 ± 0.89 , $p = 0.002$) with no significant increase in the control group. Factors independently related to higher PES-NWI included intervention site and less years in critical care ($p < 0.05$).

Conclusions: Implementation of Nursing Rounds within the intensive care environment is feasible and is an effective strategy for initiating change to patient care. Application and testing of this strategy, including identification of the most appropriate methods of measuring impact, in other settings is needed to determine generalisability.

Keywords

Evidence-based practice, intensive care, nursing, teaching rounds

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What is already known:

- Factors such as teamwork, evidence based practice and staffing have been shown to influence patient outcomes
- Clinical rounds have been used in many settings as an education and practice improvement strategy

What this paper adds:

- Implementation of Nursing Rounds within the intensive care setting is feasible and results in changes to patient care
- Nursing Rounds were associated with an improvement in interaction between nurses as measured on the NWSS
- Factors that independently predicted higher PES-NWI included practice in the intervention intensive care unit and less years in critical care

Background

Optimisation of factors that have been identified as positively influencing patient care has the potential to improve patient outcomes. Some of the factors that offer the potential for improvement in this area incorporate principles of effective decision making, team work, evidence based practice, staffing and organisational climate (Aiken, 2001, Currie et al., 2005, Kramer et al., 2007, Newhouse, 2006) with characteristics such as job satisfaction and productivity affecting organisational climate (Scott et al., 1999). Local observation and discussion has suggested these characteristics are not always present within the Australian critical care environment, with nurses experiencing minimal confidence in their ability to make decisions, limited autonomy and role delineation, and poor relationships with other members of the health care team (Bartram et al., 2004, Manias and Street, 2001, Takase et al., 2006).

Further, the use of evidence informed practice in nursing is limited despite the availability of multiple sources of information to inform clinical decisions. Work undertaken across several countries has found that nurses place significant emphasis on information obtained from human sources, in other words clinical nurse specialists and experienced clinical colleagues (Marshall, 2008, Spenceley et al., 2008, Thompson et al., 2001). Therefore any attempt to increase the use of evidence in clinical practice must enable information exchange between clinical nurses.

Development of processes and skills to facilitate autonomy, clinical decision making, effective team relationships and aid the integration of evidence into clinical practice has significant potential to facilitate professional nursing practice and positively influence patient care.

One strategy that has the potential to enable nurses to develop competence and confidence in these areas is that of clinical rounds. Clinical rounds have been described in various settings and formats, but are generally used to improve the use of evidence in practice, provide a forum to maintain currency and competence, model expertise and leadership, acknowledge expertise, decrease staff isolation, promote professional development and develop clinical decision making, communication and presentation skills (Close and Castledine, 2005, Dick and Foust, 1990, Dodek and Raboud, 2003, Gardner et al., , Gardner et al., In Press, Lannon, 2005, Perry and Paterson, 2005, Van Hoof et al., 2009).

The clinical rounds intervention tested in this study was designed to improve nurses' autonomy, involvement in decision making, relationships with other health care professionals and use of evidence to improve their perceptions of the practice environment as a setting for professional nursing practice and in turn improve worklife satisfaction. Given the focus on nursing practice and nurse decision making, these round were termed Nursing Rounds and have been referred to as such throughout this paper. They represent one adaption of previously reported clinical rounds. Therefore the project was designed to:

1. Improve processes for the problem-solving and strategic planning of nursing care within the critical care environment.
2. Determine the effectiveness of implementing Nursing Rounds in the intensive care environment, in terms of nurses' improved perceptions of the practice environment and work satisfaction

Methods

This study used a pre-test post-test comparative design to determine the effect of a Nursing Rounds intervention on multiple outcomes.

Setting

The study was conducted in two intensive care units (ICU) located in tertiary hospitals in a metropolitan area in Australia. These sites were selected as being as similar as possible in workload and staffing characteristics to each other. The ICUs were both Level 3 units with similar mixed medical and surgical patient loads, with 22 and 18 open beds respectively at the time of study implementation, similar numbers of nursing staff (approximately 175 in each unit), similar percentages of nursing staff with critical care qualifications (45 - 55%), routine 1:1 RN: patient ratio and 1 support nurse for every 4-5 patients. Both sites had a history of stable staffing, therefore decreasing the chance of rival explanations for any changes in the outcomes measured. The selection of the intervention site was based on a desire for change, specifically to introduce Nursing Rounds, and the resources available to support Nursing Rounds; the second ICU served as the control site. The purpose of the control site was to be able to distinguish the impact of the Nursing Rounds intervention in contrast to the usual changes in practice that occur with progression of time. Although the ICUs were located in the same metropolitan area, cross contamination between the intervention and control sites was unlikely due to a history of limited movement of staff between the two organisations and few common educational or professional activities. Usual care that continued in both units involved handover of patients at the beginning of each shift; these handover periods did not include time for extensive

discussion of the patient. Education and professional development sessions also occurred in each unit in both a scheduled and ad hoc manner.

Sampling and recruitment

All registered nurses who were full and part time staff in the ICUs involved in the study were invited to participate. Information sessions were conducted at convenient times in each of the units, with study details and Participant Information Sheets also emailed to all nurses. Consent was sought by a research assistant in order to avoid perceptions of coercion by any of the investigators as some investigators occupied supervisory roles.

Sample size

Prior to commencing the study we were not able to locate any similar projects that had assessed the impact of a nursing practice intervention on perceptions of the practice environment or nursing satisfaction to inform sample size calculations. However, given the impact that nursing practice interventions have had on other outcomes, it was reasonable to expect that an intervention such as this might result in a small effect size. As a result, the study had 80% power to detect a difference, with a significance level of 0.05 (2-tailed), in means of 0.4 with a standard error of 0.8 using a sample size of 63 participants per group

Outcomes and data collection procedures

The outcomes measured for this study included the Practice Environment Scale - Nursing Work Index (PES-NWI) (Lake, 2002) and the Nursing Worklife Satisfaction Scale (NWSS) (Stamps, 1997). The Practice Environment Scale of the Nursing Work Index (PES-NWI) is a 31 item, 5 subscale instrument that was used to characterise the

extent to which the environment facilitated professional nursing practice. The reliability (individual level internal consistency $\alpha > 0.70$; hospital level interitem correlation of 0.64 – 0.91) and construct validity of the PES-NWI have been demonstrated (Lake, 2002).

The Nursing Worklife Satisfaction Scale (NWSS) is a two part instrument designed to measure nurses' expectations and satisfaction with a range of six job components including autonomy, relationships, work tasks and professional status. Total scale reliability has been reported at 0.85, with subscale reliability ranging from 0.70 – 0.90, while validity was indicated through factor analysis where factor loadings were above 0.4 (Stamps, 1997).

Demographic details including age, initial nursing qualification that led to registration or enrolment, highest nursing qualification, highest educational qualification, number of years in nursing, number of years in critical care and part time or full time employment were also collected in the questionnaires. Respondents in the intervention ICU were also asked how many Nursing Rounds they had participated in at the post-test time point.

Questionnaires were distributed during information sessions, via email to all nursing staff, supplied in several identified locations in each ICU and distributed by the research assistant as they circulated through the ICUs answering any questions about the study, participation or the questionnaires. Additional information regarding the study could be sought from any of the study team via email, telephone or in person. Return of questionnaires was via a secure drop box in each ICU, via internal post to

the research assistant or handed directly to any member of the research team.

Questionnaires were able to be completed at any time during eight weeks prior to and after the 12 month intervention period. The communication and information strategy was repeated at regular intervals throughout the study period and in particular during the data collection period to ensure new staff and those returning from leave were familiar with the study and the process of Nursing Rounds.

Data describing the process of Nursing Rounds were also collected by the research assistant during the conduct of the Rounds and all participants were aware of this ongoing data collection. These data included the number and role of Round participants, all short and long term issues identified during discussion, decisions made to overcome the identified care issues and the team member responsible for implementing change, as well as any informal education provided during the Nursing Rounds.

Intervention

Nursing Rounds were held two days each week and lasted one hour during which time two patients were reviewed. Senior clinical staff identified the patients to be reviewed based on clinical condition and progression as well as perceived challenges in future care for the patient. The focus of these Nursing Rounds was on strategic improvement of nursing care and methods for critically examining issues and challenges, considering relevant evidence and optimising care plans. Structural considerations included:

- Nursing Rounds were led by the Clinical Nurse Consultant (CNC) or Nurse Unit Manager (NUM) and supported by the Chair or Senior Research Fellow in Critical Care Nursing

- other participants included the ICU team leader, support nurses, the nurse caring for the patient, the hospital librarian and other nursing staff as time and patient needs permitted
- the patient's primary nurse, with support from the CNC, presented the patient details including a brief synopsis of the patient admission, current condition, problems and challenges, and desired goals.

The patient and family and additional nursing experts, for example the stomal therapist or trauma CNC, were included in the discussion where appropriate. Staff were encouraged to question and review current and future care, and strategies to improve care were planned, with a team member responsible for implementation of changes identified. Only two patients were reviewed during each Nursing Round to ensure sufficient time for meaningful discussion of challenges and possible solutions. A summary of the discussion, including decisions made and changes to care, was documented in the patient notes by the CNC or NUM on completion of the Nursing Round.

Analysis

Categorisation of the issues raised during Nursing Rounds was conducted independently by two investigators (LMA & SC), with 97.1% agreement on initial analysis. Agreement on all differing categorisations was reached with discussion.

Statistical data analysis was conducted using Stata 10 (Statacorp/Texas). Descriptive statistics were used to describe the characteristics of the sample as well as all study variables using t-tests for continuous variables and chi-squared tests for categorical

variables. Continuous variables were tested to confirm normality of data distribution prior to undertaking analysis.

The percentage of nurses deciding between job component priorities were calculated using the 15 item paired comparisons technique contained within Part A of the NWSS. From these, the component weighting coefficients were then calculated. Part B of the NWSS consisted of a 44 item Likert scale (7 point scale from agree to disagree) questionnaire arranged within subscales for each job component including pay, autonomy, task requirements, organisational policies, professional status and interaction, with mean scores for each job component calculated. The index of work satisfaction (IWS) value was then derived from the scores for each job component (i.e. Part B) adjusted by the weighted coefficient scores from part A of the NWSS. The pre and post intervention IWS was calculated for each site and reported.

PES-NWI was calculated by recoding negative items and generating mean scores for each sub-scale. Analysis involved examination of the differences between pre and post scores on each of the scales and subscales means using t-tests.

Univariate analysis using the PES_NWI as the dependent variable was performed with pre and post intervention as an independent variable. Other potential predictors included age group, gender, employment type (full or part time), employment level, highest qualification, years in nursing and critical care and study site. This was followed by multivariate modelling where factors significant on univariate analysis ($p < 0.1$) were included in a multivariate (linear regression) model to determine factors

that were independently related to the PES-NWI. $P < 0.05$ was considered significant for all analyses

Ethical review

The conduct of this study was approved by the Human Research Ethics Committees of both participating hospitals and the university employer of the first author. All nursing staff within the participating ICUs were provided with a Participant Information Sheet outlining the study, consent was assumed with return of the questionnaires. Participation in Nursing Rounds was considered routine practice within the intervention ICU, although the option for nurses to choose not to present their patient details for discussion was available; when this occurred the CNC presented the patient details for discussion.

Results

Nursing Rounds Process

An average of six personnel participated in each Nursing Round conducted during the 12 month period from May 2008. These personnel included Registered Nurses, Clinical Nurses (i.e. senior registered nurses), CNCs (i.e. clinical specialists), NUMs (i.e. nursing managers of ICU), Educators, Clinical Researchers (including Professor of Critical Care Nursing, Senior Research Fellow and Research Nurses) and a hospital librarian.

Five hundred and seventy-seven changes were initiated for the 171 patients reviewed during 12 months of Nursing Rounds and related to the physical, psychological – individual, psychological – family, communication or professional practice aspects of care (Table 1). There were also 51 episodes of education that occurred during Nursing Rounds covering topics such as the principles of managing neutropenic patients, current indications for the use of hyoscine butylbromide (Buscopan) and recent developments in ventilation weaning strategies.

Participant Flow

Participants who completed the questionnaires (n = 244) were registered nurses recruited from both the control and intervention ICU prior to and following 12 months of Nursing Rounds (intervention: 84 pre, 55 post; control: 53 pre, 57 post). Pre-intervention data collection occurred in March – April 2008, Nursing Rounds were conducted April 2008 – April 2009 and post-intervention data collection occurred in May – June 2009.

Participants were predominantly female (81%), working full time (77%), with a median (IQR) of 8 (2-14) years practice as a registered nurse with 4 (1-10) years of that practice in critical care. The majority of participants (n = 175, 71%) had a Bachelors' degree as their initial nursing qualification. Approximately half of the participants (n = 122[49%]) had a bachelor's degree as their highest nursing qualification while 90 (37%) had a graduate certificate or diploma and 18(7%) had a Master's degree. Demographic characteristics did not differ significantly between the intervention and control sites at baseline, although nurses who completed the post-intervention questionnaires in the control site had significantly less years experience than those in the intervention site (median [IQR] 5 [2-10] years compared to 11 [5-15] years; p= 0.004). Forty six of the 55 (84%) respondents to the post-intervention questionnaire in the intervention ICU had participated in Nursing Rounds during the study period, with the majority of these having participated in 3 to 10 Rounds.

Nurses' perceptions and satisfaction

Total PES-NWI scores, as well as all subscale scores, were similar before and after the study period in both the intervention and control sites (Table 2). Total NWSS scores were also similar before and after the study period (Table 3), although the NWSS sub-scale of interaction between nurses significantly improved in the intervention unit during the 12 months of the study period (pre – 4.85±0.93; post – 5.36±0.89, p = 0.002) with no significant increase seen in the control group.

The IWS scores in the control site were lower on the post intervention survey compared to the pre intervention at 12.64 (range 8.28 – 16.03) and 13.65 (range 8.65 – 17.54) respectively. In contrast, the intervention site score improved slightly post

intervention from 13.70 (range 9.98 – 16.78) to 13.82 (range 10.35 – 17.54).

Organisational policies consistently had the lowest job component scores across both sites while autonomy and professional status were the highest scoring components.

Factors related to the outcome of PES-NWI on univariate analysis included site and years in critical care. These, along with time in relation to the intervention (i.e. pre or post intervention) were entered into a linear regression (Table 4). Factors independently related to PES-NWI included the intervention site and years in critical care ($p < 0.05$). Scores on the PES-NWI were lower in the control site and also reduced slightly for every year of longer critical care experience.

Consultation with nursing staff in intervention site

Consultation was conducted with nursing staff in the intervention ICU during June and July 2009 to determine their attitudes to Nursing Rounds and provide broader feedback than was possible using questionnaires. This consultation, conducted during regular education sessions, included feedback of the results of the study and broad discussion about the benefits and limitations of continuing Nursing Rounds. Specific questions as to whether to continue Rounds and if so, in what format, were also included. While the majority of staff were supportive of Nursing Rounds and believed the forum should continue as routine practice, there was a small number of staff who considered the Rounds unnecessary or inappropriate. The most positive comment suggested that Nursing Rounds is 'preferential treatment' for the patients who are reviewed and should be made available for all patients to ensure optimal care. Themes in the discussions included:

- Simplify presentation to four questions (What caused the patient to be admitted to hospital/ICU? What are the main issues since admission? What are the main issues now? What do you envisage will be the main issues and challenges for the remainder of the patient's stay?) to avoid presenters believing they need to provide a detailed summary of assessment and treatment
- Recurrent theme of stress associated with presenting - this was frequently raised by more experienced staff as a concern regarding less experienced staff, however when questioned many of the newer staff members reported being very comfortable with the process
- Need to ensure positive feedback is provided to nursing staff during Rounds
- Essential that the summary entry in the patient chart should include who is responsible for actioning the decisions so that information is not lost
- In determining which patients are reviewed consider both the patient and the nurse, as well as other activities taking place (for example staff competency assessments); there was a perception by some that junior nurses were likely to benefit more from participating in Rounds than senior staff, although this was not universal
- Mixed views on optimal frequency, with some suggesting as much as daily while others thought weekly was sufficient
- Opinion regarding the optimal timeframe to review each patient varied from 15 – 30 minutes.

Discussion

The Nursing Rounds intervention implemented in this study was in line with contemporary health service practice in that it was structured as a “bed-side” forum to facilitate collaborative problem identification, clinical decision making and incorporation of evidence at the point of care to promote individualised patient centred, evidence based nursing practice. Current provision of nursing care offers few opportunities for interaction and shared problem solving within the nursing team. The organisation of Nursing Rounds, as reported in this paper, offered an opportunity for these processes and was well received by many members of the nursing team.

Nurses within the clinical environment have repeatedly identified a lack of expertise to access relevant evidence and use it in a meaningful manner (Kajermo et al., 2008, Melnyk et al., 2004). The setting where this project was implemented has ready access to multiple sources of evidence (Henderson et al., 2006), therefore we considered it important to consider strategies that might assist clinical nurses to make use of this evidence. For this reason, Nursing Rounds included a clinical librarian to facilitate development of the skills needed to access and use the readily available resources in a timely and manageable fashion. This strategy has proven effective in various settings and was positively received in this project with additional workshops with the librarian requested by clinical staff early in the twelve month period of the intervention (Schacher, 2001, Tod et al., 2007). The librarian involved (CD) has anecdotally noted that staff from the intervention ICU where the workshops were conducted appear more confident in searching databases and accessing electronic resources when visiting the library, as well as being more interactive with the librarians than they were prior to the series of workshops. Where clinicians have the

benefit of bedside computer access it is essential that they have the skills to use ‘point of care’ tools such as UpToDate (Wolters Kluwer Health, Waltham, MA, USA), Best Practice (BMJ Group, London, UK) and Dynamed (Ebsco Publishing, Ipswich, MA, USA) and regular workshops may be beneficial in helping develop these skills.

Nursing Rounds have been effective in initiating changes to many aspects of care. These changes to care were recorded by a research assistant present during the Nursing Rounds. Given that all participants were aware of the presence and role of the research assistant it is possible that this influenced the activity of the participants in being proactive to identify these potential improvements in care. The most frequent areas of change have included physical care and communication with other team members. This communication has been important in increasing the collaborative approach to care, including interaction with medical colleagues and involvement of other departments where needed. The high level of communication activities may also explain the improvement in interaction between nurses that was identified in the NWSS scale in the intervention ICU. Despite the high number of changes initiated, no other changes in nurses’ perceptions of the practice environment or worklife satisfaction were found to be statistically significant.

The absence of change on most of the subscales within the PES-NWI and NWSS may be due to several reasons. First, the intervention may not have been strong enough to change views in the areas measured. The intervention ICU employs more than 200 nursing staff. During the twelve month study period 171 patients were reviewed by an average of six staff – although this represents more than 1000 ‘staff reviews’ the reality is that half of the review group consisted of the clinical leaders, therefore only

an average of three nurses responsible for direct patient care were involved in each review. Many nurses indicated that they had only been involved in one or two Nursing Rounds during the year, with some staff involved in no Rounds. Second, although the PES-NWI (designed to measure the extent to which the environment facilitates professional nursing practice) and the NWSS (designed to measure nurses' expectations and satisfaction related to autonomy and relationships among other components) were closely aligned with our aim of improving nurses' autonomy, involvement in decision making, and interdisciplinary relationships to improve their perceptions of the practice environment and worklife satisfaction, it may be that the two selected instruments were not sufficiently sensitive, or measured a different construct to those that were actually affected by the Rounds. Further exploration of related concepts is warranted.

Finally, it should be noted that the perceptions of the practice environment and worklife satisfaction within the intervention ICU were relatively positive at the beginning of the study, with scores consistently above those measured in the control ICU. Scores also appear to be higher than those reported in the literature in some other cohorts (Best and Thurston, 2006, Best and Thurston, 2004, Moorer et al., 2010, Patrician et al., 2010). Implementation of Nursing Rounds in a setting with less positive attitudes may result in greater change to the outcomes measured.

Limitations

This project was conducted as a non-randomised, two group study in two metropolitan ICUs in Australia. The nurses who completed the pre-intervention questionnaire at each of the sites were similar on most variables measured, and where

differences existed these were incorporated into analysis. Despite this, there may have been further differences in the two sites that were not measured and account for the influence of the site on the primary outcomes. In addition, the intervention ICU has excellent resourcing in terms of professional leadership, access to evidence and managerial support. It is not known whether the findings are generalisable to other acute care, or even critical care, settings.

Conclusion and Recommendations

This study has demonstrated that the implementation of Nursing Rounds within the ICU environment is feasible and is an effective strategy for initiating change to many aspects of care, particularly physical care and communication with other team members. In this setting, the conduct of Nursing Rounds over a twelve month period was associated with an improvement in interaction between nurses.

The application of this strategy to other settings is not known and should be tested in further research. Refinements of the strategy to meet local requirements should also be undertaken and tested. It is also not clear how best to measure the impact of strategies such as Nursing Rounds. Given the complex nature of the acute and critical care environments, it is unlikely that a direct impact on patient outcomes will be able to be identified without extremely large studies and participant numbers. Therefore appropriate process outcomes should be identified.

This intervention was developed in response to discussion by local clinical leaders. Nursing staff within the study ICU have elected to continue Rounds as a routine component of practice. In addition, staff from other clinical areas within the hospital

are currently planning to adapt the process for implementation within their wards and units. This demonstrates the potential that exists when nursing leaders from within and between settings work together to introduce and adapt strategies for care provision.

Table1 – Issues Identified During Nursing Rounds

Category	N (%)	Example
Physical	244 (42.3)	<ul style="list-style-type: none"> • Order larger bed from central store for large pt • Use ‘bath bags’ to increase moisture for patient with fragile, dry skin
Psychological – Individual	17 (2.9)	<ul style="list-style-type: none"> • Arrange visit by Recreation Officer for long term patient • Move long term patient to single room to optimise sleep/wake cycle
Psychological – Family	59 (10.2)	<ul style="list-style-type: none"> • Request consultation by stomal therapist • Liaise with medical colleagues regarding care goals
Communication	217 (37.6)	<ul style="list-style-type: none"> • Complete adverse event form • Review of strategies to keep staff safe from aggressive family member
Professional Practice	40 (6.9)	<ul style="list-style-type: none"> • Liaise with social worker to arrange accommodation for family • Development of methods to manage conflict between family members

Table 2 – Practice Environment Scale – Nursing Work Index

Scale / Subscale	Site	Pre	Post	p value
PESNWI	Intervention	2.93±0.35	2.94±0.33	p = 0.90
	Control	2.60±0.38	2.64±0.46	p = 0.59
Subscales				
Nurse participation in hospital affairs	Intervention	2.78±0.52	2.76±0.44	p = 0.84
	Control	2.37±0.43	2.42±0.60	p = 0.68
Nursing foundations for quality of care	Intervention	2.96±0.40	2.97±0.33	p = 0.83
	Control	2.67±0.40	2.70±0.55	p = 0.69
Nurse manager ability, leadership and support of nurses	Intervention	3.12±0.41	3.15±0.42	p = 0.66
	Control	2.44±0.56	2.59±0.64	p = 0.23
Staffing and resource adequacy	Intervention	3.00±0.90	3.04±0.47	p = 0.76
	Control	2.78±0.48	2.80±0.54	p = 0.81
Collegial nurse_physician relations	Intervention	2.90±0.59	2.83±0.55	p = 0.49
	Control	3.04±0.46	2.98±0.57	p = 0.50

Table 3 – Nursing Worklife Satisfaction Scale

NWSS	Intervention	4.49±0.63	4.55±0.62	p = 0.61
	Control	4.26±0.63	4.20±0.70	p = 0.62
Subscales				
Pay	Intervention	3.04±1.18	3.06±1.04	p = 0.92
	Control	2.98±1.03	3.08±1.17	p = 0.64
Professional Status	Intervention	5.37±0.78	5.31±0.81	p = 0.64
	Control	5.14±0.90	5.21±0.75	p = 0.65
Autonomy	Intervention	5.00±0.75	4.80±0.82	p = 0.14
	Control	4.69±0.73	4.40±0.95	p = 0.08
Organisational policies	Intervention	4.02±0.94	4.19±0.95	p = 0.31
	Control	3.21±1.71	3.45±0.89	p = 0.35
Task requirements	Intervention	4.52±1.13	4.55±0.85	p = 0.86
	Control	4.36±0.93	4.22±1.00	p = 0.43
Interaction (total)	Intervention	4.66±0.90	4.95±0.86	p = 0.06
	Control	4.76±0.79	4.52±1.03	p = 0.18
Interaction (nurses)	Intervention	4.85±0.93	5.36±0.89	p = 0.002
	Control	4.60±1.01	4.35±1.24	p = 0.25
Interaction (physicians)	Intervention	4.55±1.13	4.71±1.06	p = 0.40
	Control	4.77±0.84	4.61±1.22	p = 0.42

Table 4 – Linear regression to determine predictors of PES-NWI scores

Factor (reference group)	Coefficient (95% CI)	p value
Time in relation to intervention (pre)	0.02 (-0.07 – 0.11)	0.66
Site (intervention)	- 0.27 (-0.36 – -0.18)	<0.001
Years in critical care	-0.01 (-0.02 – -0.005)	0.002

Adj R2 – 0.14; F (3, 240) = 14.02; p < 0.001

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