Research Square

Preprints are preliminary reports that have not undergone peer review.
They should not be considered conclusive, used to inform clinical practice,
or referenced by the media as validated information.

Effectiveness of a structured developmental supportive care training programme on neonatal nurses' knowledge, attitudes and practices of nesting and swaddling: a two-group pre-test–post-test study in the United Arab Emirates

Hiba Ahmed Saeed[1]
Gulf Medical University
Ponchitra Ramanathan[2]
Gulf Medical University
Priya Joseph[3]
dr.priya.j@gmu.ac.ae
Gulf Medical University
Mary Walton[4]
Selva Titus Chacko[5]
Gulf Medical University
Sheeja Thompson[6]
Shaikh Khalifa Medical City
Dr.Collin Chandler
University of Edinburgh

Research Article

Keywords: developmental supportive care, neonatal nursing, pre-term infant, nesting, swaddling, nurse education, knowledge, attitude, clinical practice

Posted Date: November 25th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-11638759/v1

License: This work is licensed under a Creative Commons Attribution 4.0 International License.
Read Full License

Additional Declarations: No competing interests reported.

Abstract

Background

Nesting and swaddling are developmental supportive care strategies for preterm infants, but their safe and consistent use depends on nurses' knowledge, attitudes and practical skills. We evaluated a structured training programme for neonatal nurses in a tertiary hospital in the United Arab Emirates.

Methods

In this two-group pre-test–post-test study (December 2025 to March 2026), 28 eligible neonatal nurses were allocated by lottery to an intervention group (n = 14) or a control group (n = 14). The intervention group received a structured programme of presentation, mannequin demonstration, instructional video, discussion and supervised return demonstration. The control group continued routine practice and was assessed first. Knowledge (12-item questionnaire), attitude (15-item scale) and observed practice (30-item checklist, one blinded observer) were measured at baseline and 14 days later. We used paired and independent-samples t tests, Fisher's exact test and Pearson correlations.

Results

In the intervention group, mean knowledge rose from 8.1 to 10.5 ($p = 0.004$), attitude from 58.5 to 64.1 ($p = 0.048$) and practice from 22.2 to 27.0 ($p < 0.001$). In the control group, knowledge and attitude did not change significantly, and practice rose from 22.8 to 25.0 ($p = 0.046$). At post-test, the intervention group scored higher than the control group for knowledge (10.5 vs 8.0; $p = 0.001$), attitude (64.1 vs 56.7; $p = 0.036$) and practice (27.0 vs 25.0; $p = 0.011$). Good knowledge was reached by 85.7% of intervention and 21.4% of control nurses ($p = 0.002$). In the intervention group, knowledge, attitude and practice scores were positively correlated ($r = 0.564$ to 0.850).

Conclusions

A short, structured programme combining theoretical and practical teaching was associated with higher knowledge, attitude and observed practice scores at 14-day follow-up. Larger multicentre studies with concurrent controls, longer follow-up and infant-centred outcomes are needed.

Trial registration:

Not registered. The study evaluated an educational programme for nurses and did not assign patients to a health-related intervention.

Background

Preterm infants are born before 37 completed weeks of gestation and frequently require care in neonatal intensive care units (NICUs). Their physiological and neurological immaturity makes them vulnerable to environmental stressors, including excessive noise and light, repeated handling, painful procedures and disrupted sleep. Developmental supportive care seeks to reduce avoidable stress and support physiological and neurobehavioural organisation through practices such as sleep protection, family involvement, gentle handling and supportive positioning [1–3].

Nesting and swaddling are practical components of developmental supportive care. Nesting uses supportive boundaries to help maintain flexion, midline orientation and containment. Swaddling provides gentle containment while preserving appropriate movement, particularly at the hips. Studies have examined their potential effects on sleep, arousal, behavioural readiness and feeding progression in preterm infants [4–7]. Safe application requires individual assessment and attention to positioning, thermal regulation, respiratory effort, skin integrity and suffocation hazards.

Neonatal nurses are central to the delivery of these interventions because they provide continuous bedside care and perform positioning, comfort measures and parent education. However, implementation may vary with prior training, clinical experience, workload and the availability of standardised guidance. Previous educational interventions have reported improvements in nurses' knowledge and performance related to nesting, swaddling and broader developmental care [8–11]. Nurses' knowledge, attitudes and practice of developmental care have also been examined in Saudi Arabia and Jordan [12, 13], and further training programmes have been reported more recently [14, 15]. Research examining structured training in Gulf-region neonatal services remains limited.

The present study evaluated a structured Preterm Neonatal Developmental Supportive Care Program (PNDSCP) focused on nesting and swaddling among neonatal nurses in a tertiary hospital in Ajman, United Arab Emirates (UAE). The objectives were to compare knowledge, attitude and practice scores between intervention and control groups before and after training, examine relationships among the three outcome domains, and explore associations between post-test outcomes and selected nurse characteristics.

Methods

Study Design and Setting

A quantitative two-group pre-test–post-test study was conducted in the NICU and Special Care Baby Unit (SCBU) of Sheikh Khalifa Women and Children Hospital, Ajman, UAE (Fig. 1). Participants were not randomly selected: all eligible nurses were enrolled, and they were then randomly allocated to the intervention or control group by a lottery method. To reduce contamination between groups, data collection for the control group was completed before the intervention group received training. Because

the control group was therefore assessed non-concurrently, the study is described as quasi-experimental. Data were collected from December 2025 to March 2026.

Participants and Sampling

The study included 28 registered nurses working in the NICU or SCBU who had at least six months of clinical experience, provided direct patient care and consented to participate. Nurses on long leave and nurses in non-clinical administrative roles were excluded. Total enumeration sampling was used to recruit the eligible workforce; 14 nurses were allocated to the intervention group and 14 to the control group. No formal sample-size calculation was undertaken because the eligible population was small.

Intervention

The PNDSCP was developed by the investigator following a literature review and consultation with experts in neonatal and paediatric nursing. Content covered developmental supportive care; definitions, principles and types of nesting and swaddling; benefits and potential complications; contraindications and precautions; alternatives; assessment of infant readiness; the nurse's role; and parent education. Five experts reviewed the content. The intervention was delivered in three small-group sessions, with approximately five nurses per session, and the same content was used across sessions.

Each session included a structured presentation, a live demonstration of nesting and swaddling using a neonatal mannequin, an instructional video, interactive discussion and supervised return demonstration. The control group continued routine unit practice and was offered the programme after completion of the post-test. The interval between training and post-test was 14 days.

Measures

Data was collected using four investigator-developed instruments. A demographic form recorded participant characteristics, including age, qualification, years of nursing experience and previous training in nesting and swaddling. The 12-item multiple-choice knowledge questionnaire assigned one point for each correct answer (range 0–12); scores of 10–12 were classified as good, 7–9 as average and 0–6 as poor.

Attitude was assessed using a 15-item Likert scale scored from 1 (strongly disagree) to 5 (strongly agree), with items 9–15 reverse-scored (range 15–75). Scores were categorised as strongly positive (65–75), positive (55–64), neutral (45–54) or negative (below 45). Observed practice was assessed using a 30-item checklist covering nesting (9 items), swaddling (12 items) and safety considerations (9 items). Each correctly performed action received one point (range 0–30); scores of 26–30 was classified as good, 21–25 as average and below 21 as poor.

Content validity was established by five experts in paediatric nursing, neonatology and nursing research, who rated each item for relevance and clarity. The scale-level content validity index (S-CVI/Ave) was 0.90. A pilot study was then conducted with five nurses from the paediatric intensive care unit who rotate through the neonatal intensive care unit and special care baby unit (SCBU) and therefore have the same exposure to preterm infant care as the target population. These nurses were not included in the main study. The pilot was used to assess the clarity, feasibility and internal consistency of the tool. Internal consistency was 0.896 for the knowledge questionnaire (KR-20; 12 dichotomously scored multiple-choice items), 0.903 for the attitude scale (Cronbach's alpha, after reverse-scoring negatively worded items) and 0.899 for the practice checklist (KR-20). Practice was assessed by one trained observer who was blinded to group allocation.

Data Collection

After ethical and administrative approvals, eligible nurses were informed about the study and written informed consent was obtained. Participants completed the demographic form, knowledge questionnaire and attitude scale, and practice was assessed using direct observation. The intervention group received the PNDSCP; the control group continued routine care. The same instruments were administered 14 days later. The control group was offered the training after post-test completion.

Statistical Analysis

Data was analysed using IBM SPSS Statistics version 29. Descriptive statistics included frequencies, percentages, means and standard deviations (SD). Shapiro–Wilk tests were used to assess normality. Paired-samples t tests compared pre-test and post-test scores within each group; independent-samples t tests compared groups at baseline and post-test. Fisher's exact test was used for selected categorical comparisons, Pearson's correlation coefficient assessed relationships among post-test knowledge, attitude and practice scores, and chi-square tests examined associations between selected characteristics and post-test score categories. Tests were two-sided and $p < 0.05$ was considered statistically significant. No adjustment was made for multiple comparisons. Given the small sample and sparse cells in some categorical analyses, these exploratory associations should be interpreted cautiously.

Ethical Consideration

Ethical approval

s, permissions and consent procedures are described in the Declarations. Participation was voluntary, participants could withdraw without employment-related consequences, and coded data were used to protect confidentiality.

Use of Generative AI

The authors used Claude (Anthropic) to restructure and edit the manuscript text and to draw the figures. The authors reviewed the output and take full responsibility for the content.

Results

Participant Characteristics

Twenty-eight nurses participated, with 14 in each group. The groups were similar in age, years of experience, qualification and previous training in nesting and swaddling (Table 1). Mean age was 38.6 years (SD 7.0) in the intervention group and 38.3 years (SD 6.2) in the control group. Most participants had more than 10 years of nursing experience.

Table 1
Characteristics of participating nurses

Characteristic	Intervention (n = 14)	Control (n = 14)	p value
Age, years, mean (SD)	38.6 (7.0)	38.3 (6.2)	—
Age 31 to < 40 years, n (%)	10 (71.4)	9 (64.3)	1.000
Age 40–50 years, n (%)	4 (28.6)	5 (35.7)	
Nursing experience 6–10 years	3 (21.4)	2 (14.3)	1.000
Nursing experience > 10 years	11 (78.6)	12 (85.7)	
Bachelor’s degree	9 (64.3)	11 (78.6)	0.678
Master’s degree	5 (35.7)	3 (21.4)	
Previous training	12 (85.7)	9 (64.3)	0.385
No previous training	2 (14.3)	5 (35.7)	

Knowledge, Attitude and Practice Scores

Baseline scores did not differ between groups (knowledge p = 0.619, attitude p = 0.304, practice p = 0.672). Mean scores increased in all three domains in the intervention group. Knowledge increased from 8.1 (SD 2.2) to 10.5 (SD 1.8; paired t = 3.159, p = 0.004); attitude increased from 58.5 (SD 6.9) to 64.1 (SD 7.4; t = 2.070, p = 0.048); and observed practice increased from 22.2 (SD 3.8) to 27.0 (SD 2.2; t = 4.090, p < 0.001). In the control group, knowledge and attitude changes were not statistically significant, whereas practice increased from 22.8 to 25.0 (p = 0.046) (Table 2, Fig. 2).

Table 2
Pre-test and post-test knowledge, attitude and practice scores

Outcome (score range)	Group	Pre-test mean (SD)	Post-test mean (SD)	Paired t	p value
Knowledge (0–12)	Intervention	8.1 (2.2)	10.5 (1.8)	3.159	0.004
Knowledge (0–12)	Control	7.7 (2.0)	8.0 (1.9)	0.409	0.687
Attitude (15–75)	Intervention	58.5 (6.9)	64.1 (7.4)	2.070	0.048
Attitude (15–75)	Control	55.3 (9.1)	56.7 (10.1)	0.385	0.703
Practice (0–30)	Intervention	22.2 (3.8)	27.0 (2.2)	4.090	< 0.001
Practice (0–30)	Control	22.8 (3.6)	25.0 (1.6)	2.089	0.046

At post-test, mean scores were higher in the intervention group than in the control group for knowledge (10.5 versus 8.0; $t(26) = 3.57$, $p = 0.001$), attitude (64.1 versus 56.7; $t(26) = 2.21$, $p = 0.036$) and practice (27.0 versus 25.0; $t(26) = 2.75$, $p = 0.011$).

Categorical outcome levels

At post-test, 12 intervention-group nurses (85.7%) had good knowledge compared with three control-group nurses (21.4%; Fisher's exact $p = 0.002$). A positive or strongly positive attitude was observed in 13 intervention-group nurses (92.9%) and seven control-group nurses (50.0%; $p = 0.033$). Good practice was observed in 11 intervention-group nurses (78.6%) and five control-group nurses (35.7%); this difference did not reach statistical significance ($p = 0.054$). No participant in either group was classified as having poor practice at post-test (Table 3, Fig. 3).

Table 3
Post-test categorical knowledge, attitude and practice outcomes

Outcome category	Intervention n (%)	Control n (%)	p value
Good knowledge	12 (85.7)	3 (21.4)	0.002
Average knowledge	1 (7.1)	9 (64.3)	
Poor knowledge	1 (7.1)	2 (14.3)	
Positive/strongly positive attitude	13 (92.9)	7 (50.0)	0.033
Neutral attitude	1 (7.1)	7 (50.0)	
Negative attitude	0 (0.0)	0 (0.0)	
Good practice	11 (78.6)	5 (35.7)	0.054
Average practice	3 (21.4)	9 (64.3)	
Poor practice	0 (0.0)	0 (0.0)	

Relationship among outcome Domains

In the intervention group, post-test knowledge was strongly correlated with attitude ($r = 0.850$, $p < 0.001$) and moderately correlated with practice ($r = 0.603$, $p = 0.023$). Attitude was also correlated with practice ($r = 0.564$, $p = 0.036$). None of the corresponding correlations reached statistical significance in the control group (Table 4).

Table 4
Correlations among post-test knowledge, attitude and practice scores

Correlation	Intervention group r (p)	Control group r (p)
Knowledge–attitude	0.850 (< 0.001)	0.522 (0.055)
Knowledge–practice	0.603 (0.023)	0.022 (0.939)
Attitude–practice	0.564 (0.036)	0.148 (0.613)

Associations with nurse characteristics

Within the intervention group, more than 10 years of nursing experience was associated with higher post-test knowledge ($\chi^2 = 8.556$, $p = 0.013$), attitude ($\chi^2 = 8.061$, $p = 0.017$) and practice categories ($\chi^2 = 14.000$, $p < 0.001$). Previous developmental supportive care training was also associated with post-test knowledge ($\chi^2 = 14.000$, $p < 0.001$), attitude ($\chi^2 = 7.875$, $p = 0.019$) and practice ($\chi^2 = 8.556$, $p = 0.003$). Age and qualification were not associated with outcomes. Because of the small sample and sparse category counts, these analyses are exploratory and are not presented as confirmatory evidence.

Discussion

This study found that nurses who received the structured PNDSCP had higher post-test knowledge, attitude and observed practice scores than nurses who continued routine practice. The largest absolute improvement was observed in practice, followed by knowledge and attitude. These findings suggest that a short educational intervention combining explanation, demonstration and supervised return demonstration may be useful for strengthening nurses' developmental supportive care competencies.

The improvement in knowledge is consistent with previous studies reporting gains after learning packages and structured developmental care programmes focused on nesting and swaddling [8–10]. The current findings are particularly relevant to safety-related content, including contraindications, risks associated with incorrect positioning and the nurse's role in safe implementation. The educational programme included these issues alongside practical demonstration, which may have helped connect factual knowledge with bedside decision-making.

Attitude scores also improved in the intervention group. The post-test distribution showed that almost all intervention-group nurses had a positive or strongly positive attitude. A link between nurses' knowledge, attitudes and self-competence in developmental care has been reported in Saudi Arabia and Jordan [12, 13]. However, the change in mean attitude score was modest and the p value was close to the conventional threshold. Attitude findings should therefore be interpreted with caution, particularly given the small sample and the investigator-developed scale.

Observed practice improved in both groups, although the increase was larger in the intervention group. Gains in observed practice after structured training have also been reported elsewhere [11, 14, 15]. The improvement in the control group may reflect repeated observation, familiarity with the checklist, changes in routine practice or other unmeasured influences. The post-test mean difference between groups was statistically significant, whereas the categorical comparison of good practice was not ($p = 0.054$).

The positive correlations among knowledge, attitude and practice in the intervention group indicate that nurses with higher knowledge scores also tended to have more positive attitudes and higher observed practice scores. These correlations do not establish that improvements in one domain caused improvements in another. They are based on only 14 participants and should be regarded as exploratory.

The association of prior training and longer experience with post-test outcome categories may indicate that existing exposure to developmental care is relevant to learning and performance. Nevertheless, the very small cells in these analyses make chi-square approximations potentially unreliable. Future studies should use larger samples and prespecified models, with appropriate exact methods where expected cell counts are small.

The intervention was relatively brief and used accessible teaching resources: a presentation, mannequin, instructional video, discussion and supervised return demonstration. This combination may be feasible for continuing professional development in neonatal units. Implementation should nevertheless be

guided by current neonatal safe-sleep and positioning recommendations, local clinical policies and individual assessment of each infant.

Strengths and Limitations

The study combined self-reported outcomes (knowledge and attitude) with directly observed practice and included a comparison group, which allowed triangulation of findings across cognitive, attitudinal and behavioural domains. The intervention is described in enough detail to be replicated or adapted by neonatal nurse educators in other settings.

The findings should be interpreted in light of the study's context as a master's-level project conducted within defined time and resource constraints. The sample was modest and drawn from a single hospital, which limits the precision of estimates and the generalisability of findings. The sample size was determined by the number of eligible nurses available during the study period rather than by an a priori sample-size calculation. Participants were allocated to groups by lottery. However, because of scheduling and unit-level constraints, the control group was assessed before the intervention group, so time-related influences cannot be fully excluded. The design is therefore best regarded as quasi-experimental with a non-concurrent control group. The data collection instruments were developed for this study and underwent expert content validation and internal consistency testing; further psychometric evaluation in larger and more diverse samples is recommended. Practice scores also increased in the control group, which may reflect an observation effect (Hawthorne effect). Observer bias was minimised through a standardised observation checklist and a single observer blinded to group allocation, although complete blinding is difficult to sustain when a single unit delivers the intervention and collects data sequentially. Finally, follow-up was limited to 14 days, and neonatal clinical outcomes were not measured. The sustainability of practice change and its effect on infant outcomes therefore remain to be established. Multicentre, adequately powered, concurrently controlled studies with longer follow-up and neonatal clinical outcomes are warranted to confirm and extend these findings.

Conclusions

A structured training programme combining theoretical teaching, mannequin demonstration, video, discussion and supervised return demonstration was associated with higher knowledge, attitude and observed practice scores among neonatal nurses at 14-day follow-up. The findings support considering structured developmental supportive care training within NICU orientation and continuing professional development. Larger multicentre studies with clearly documented allocation, validated measures, longer follow-up and infant-centred outcomes are needed.

Abbreviations

MOHAP: Ministry of Health and Prevention; NICU: neonatal intensive care unit; PNDSCP: Preterm Neonatal Developmental Supportive Care Program; SCBU: Special Care Baby Unit; SD: standard

deviation; UAE: United Arab Emirates.

Declarations

Ethical approval and Consent to participate

The study was approved by the Institutional Research and Ethics Review Board of Gulf Medical University (IRB-CON-STD-164-May-2025) and by the Ministry of Health and Prevention research ethics committee (MOHAP/DXB-REC/J.S.O/No.159/2025) 21/10/2025. Permission was obtained from the hospital administration and nursing department. The study was conducted in accordance with the Declaration of Helsinki. Written informed consent was obtained from all participants.

Consent for Publication

Not applicable. No identifiable individual-level data are reported.

Clinical Trial Number: Not applicable.

Availability of data and materials

The dataset generated and analysed during the current study is not publicly available because it contains information from a small group of employees in a single clinical setting; de-identification may not fully prevent deductive disclosure. The data may be available from the corresponding author on reasonable request, subject to institutional and ethics approval.

Competing Interests

The authors declare that they have no competing interests.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial or not-for-profit sectors. It was conducted as part of a Master of Science in Neonatal Critical Care Nursing dissertation at Gulf Medical University, Ajman, UAE.

Author Contributions

HAS: Conceptualisation, data collection, formal analysis, report preparation. PR: Supervision, methodology, formal analysis and interpretation, reviewing the report, reviewing and revising the manuscript. **PJ:** supervision, methodology, formal analysis, reviewing the report, preparation of the manuscript. **MW**: Supervision, methodology, tool preparation. **STC:** Institutional support, administrative oversight and facilitation of the study at the College of Nursing.**ST:** collaboration at the study site and on-site data collection.

All authors read and approved of the final manuscript.

Acknowledgements

The authors thank the participating neonatal nurses and the hospital administration for facilitating the study.

References

1. World Health Organization. Preterm birth. Geneva, World Health Organization. : 2023. Available from: https://www.who.int/news-room/fact-sheets/detail/preterm-birth. Accessed 4 Nov 2026.
2. Yang L, Fu H, Zhang L. A systematic review of improved positions and supporting devices for premature infants in the NICU. Heliyon. 2023;9(3):e14388. 10.1016/j.heliyon.2023.e14388.
3. Kenner C, McGrath JM, editors. Developmental care of newborns and infants: a guide for health professionals. 3rd ed. Philadelphia: Wolters Kluwer; 2023.
4. Ahmed NM, Sabry YY, Khamis GM. Effect of nesting and swaddled position on behavioral readiness and feeding progression of preterm neonates. Alexandria Sci Nurs J. 2024;26(3):13–24. 10.21608/asalexu.2024.376235.
5. Pahadi NK, Chaudhary R, Karn BK, Yadav U. Effect of nesting and swaddling on sleep duration of preterm neonate hospitalized at tertiary care centre of Eastern Nepal. J Karnali Acad Health Sci. 2024;7(2). Available from: https://jkahs.org.np/jkahs/index.php/jkahs/article/view/878
6. Vadakkan AJ, Prabakaran V. Comparison of the effect of nesting and swaddling on sleep duration and arousal frequency among preterm neonates: a randomized clinical trial. J Caring Sci. 2022;11(3):126–31. 10.34172/JCS.2022.17.
7. Yapıcıoğlu H, Barutçu A, Gülcü Ü, Özlü F, Leventeli M. Effect of supportive positioning on COMFORT scale scores in preterm newborns. Düzce Med J. 2021;23(1):20–4.
8. Ahmed GEN, Mohammed BA. Effect of implementing learning package of nesting and swaddling for premature infants on nurses' knowledge and performance in NICU. Am J Nurs Res. 2019;7(4):428–36. 10.12691/ajnr-7-4-4.
9. Mohamed FM, Abdelhamed TH. Enhancement of nurses' performance toward developmental supportive care as nesting and swaddling technique for premature infant. Egypt J Health Care. 2022;13(1):1333–44.
10. Mohammed RE, Khamis GM, Sabry YY. Effect of preterm neonates' developmental supportive care program on nurses' performance. IOSR J Nurs Health Sci. 2018;7(4):33–45. 10.9790/1959-0704053345.
11. Lee HN, Cho H. Effectiveness of NICU nurses' competence enhancement program for developmentally supportive care for preterm infants: a quasi-experimental study. Heliyon. 2023;9(1):e12944. 10.1016/j.heliyon.2023.e12944.

12. AlTalaq H, Bubshait K, AlDossary L, Hussien A. Nurses' knowledge, attitude, and practice of newborn individualized developmental care at neonatal intensive care unit in Saudi Arabia: a cross-sectional study. BMC Nurs. 2025;24:1448. 10.1186/s12912-025-04087-5.
13. Abuhammor JA, Obeidat HM, Al Obieat HD, Harb EM, Abdel Razeq NM, Shudifat R, et al. Nurses' knowledge, attitudes, and perceived self-competence of individualized developmentally supportive care in Jordanian NICUs. J Neonatal Nurs. 2026;32(3):101822. 10.1016/j.jnn.2026.101822.
14. Karami T, Arzani A, Zabihi A, Nikbakht HA, Akbarian Rad Z, Jafarian Amiri SR. The effect of comprehensive developmental positioning program training on nurses' performance and infant comfort hospitalized in the neonatal intensive care unit. BMC Med Educ. 2026;26:158. 10.1186/s12909-025-08459-y.
15. Qashou AN, El-Sayed ZF, Subuh NM, Hafez MM. Effect of a nursing intervention on nurses' knowledge and practice of neonatal developmental core measures. J Neonatal Nurs. 2026;32(3):101826. 10.1016/j.jnn.2026.101826.

Figures

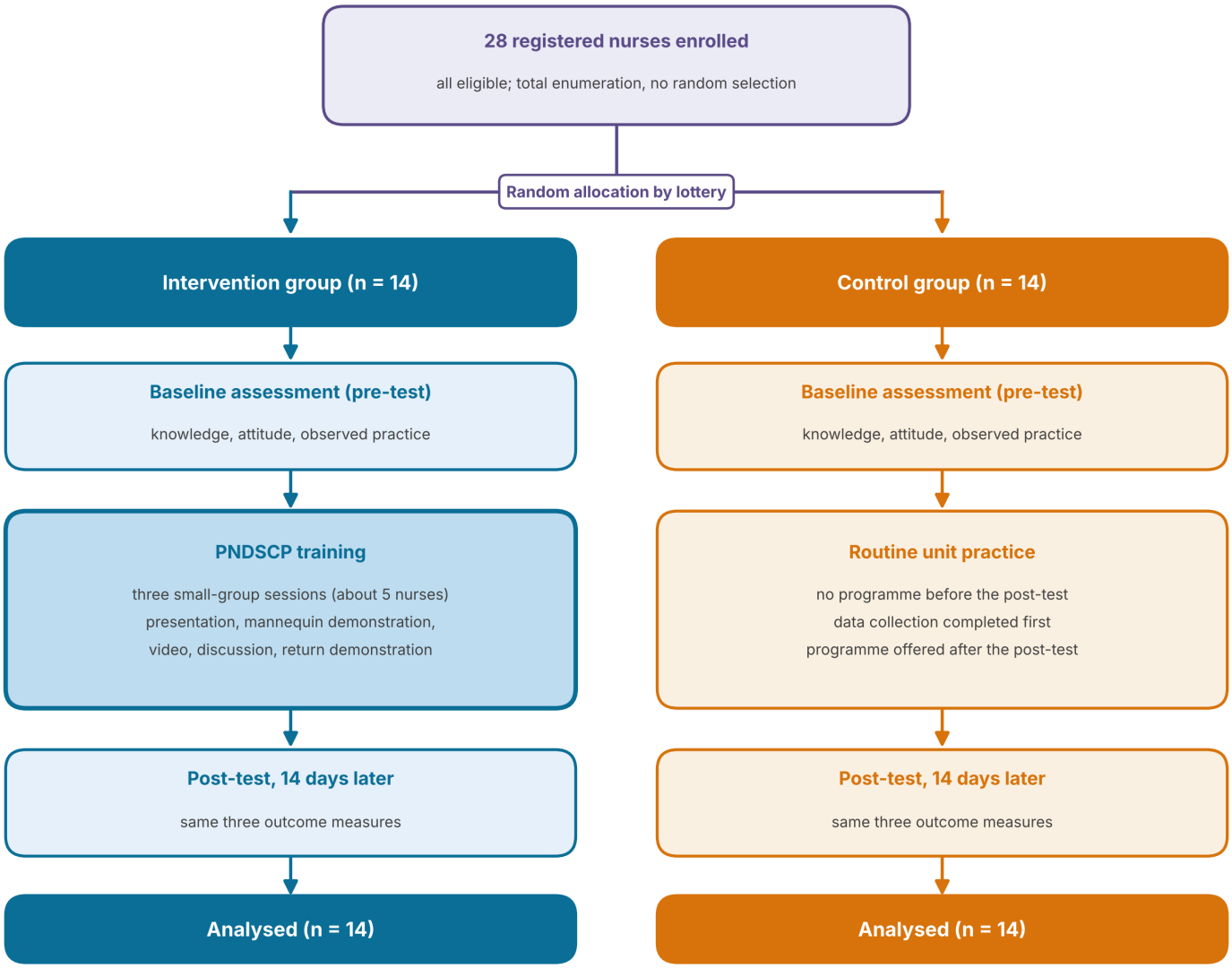


Fig 1. Study Participant Flow diagram

Figure 1

See image above for figure legend.

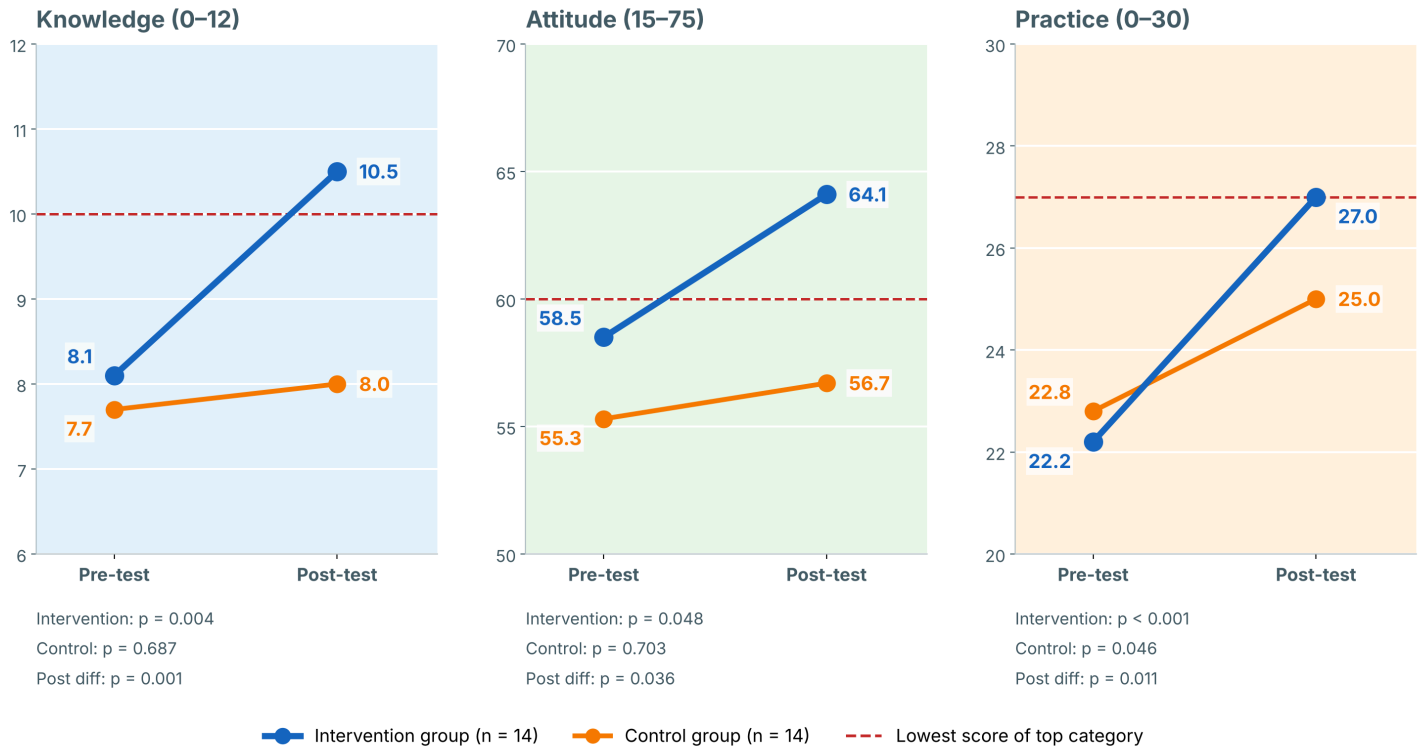


Figure 2. Mean knowledge, attitude and practice scores before and after training.

Figure 2

See image above for figure legend.

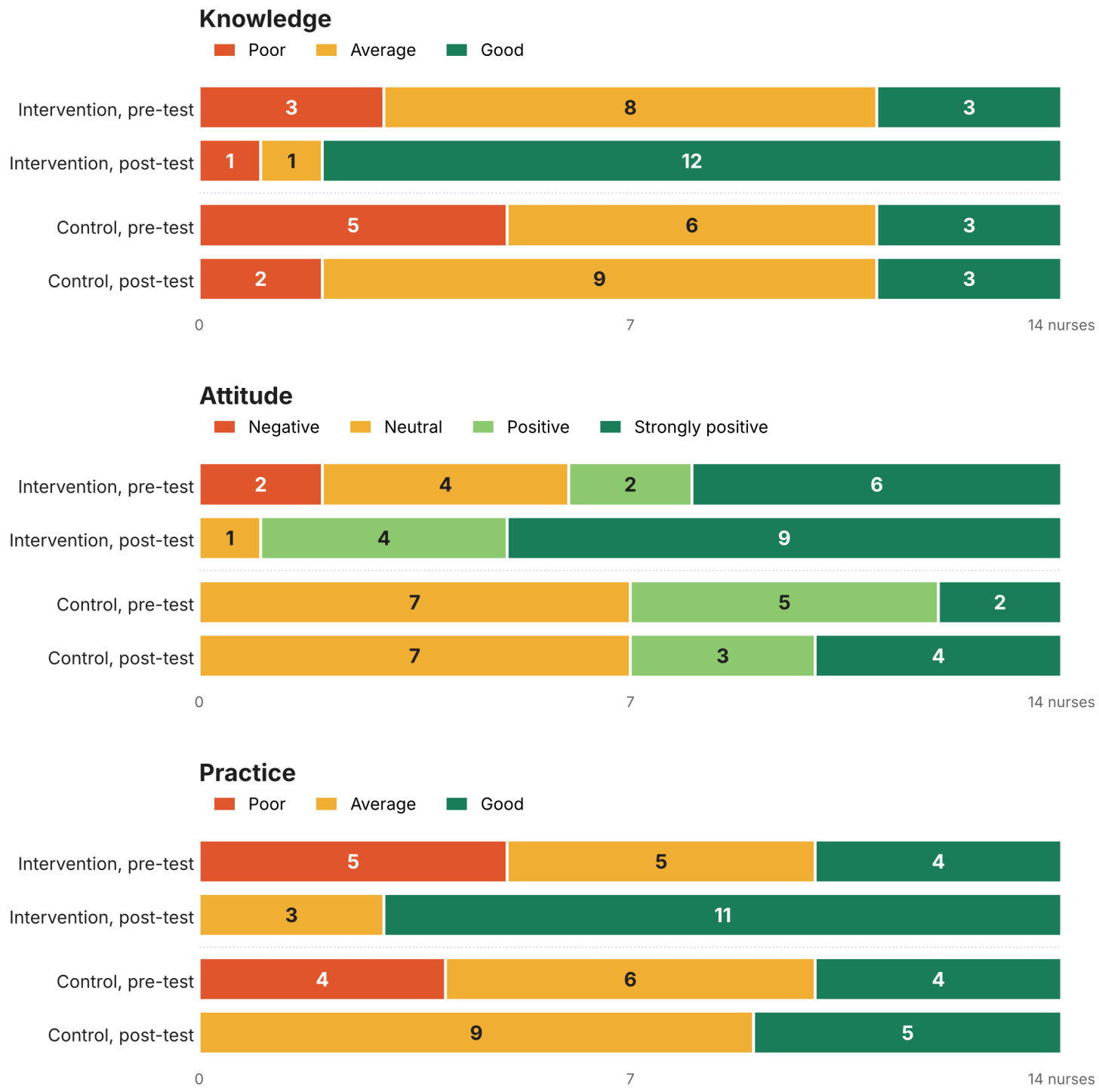


Fig 3. Categorical distribution of outcome variables

Figure 3

See image above for figure legend.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- Studytool.docx