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Effect of a standardized nursing language-based training program on nurses' use of standardized nursing terminology in clinical documentation: A quasi-experimental study

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Abstract

Background: Standardized nursing languages, including NANDA International Nursing Diagnoses, Nursing Interventions Classification, and Nursing Outcomes Classification, provide a structured approach to enhancing the quality, consistency, and measurability of nursing care. Despite their recognized benefits, their systematic implementation in clinical practice remains limited. This study aimed to evaluate the effectiveness of a standardized nursing language-based training program in improving nurses' clinical implementation of this framework.

Methods: A quasi-experimental study was conducted in 2024 at a tertiary hospital in Vietnam. A total of 120 eligible nurses were recruited into two groups: an intervention group and a control group. The intervention consisted of structured training focused on integrating standardized nursing languages into clinical documentation within the Nutrition and Safety/Protection domains. The primary outcome was the post-intervention utilization rate in nursing records. Data were collected using a structured record-review checklist and analyzed using descriptive statistics and chi-square tests at the 3-month follow-up assessment.

Results: At the 3-month follow-up, the proportion of nursing records using standardized nursing languages was significantly higher in the intervention group than in the control group (55/60 [91.7%] vs. 36/60 [60.0%], $p < 0.001$). Similar improvements were observed in both the Nutrition and Safety/Protection domains.

Conclusion: The structured training program was associated with a 31.7-percentage-point increase in the use of standardized nursing languages compared with usual practice. These findings suggest that terminology-focused educational interventions may facilitate the clinical adoption of standardized nursing languages and could be incorporated into continuing professional development and quality improvement initiatives. Further studies are needed to evaluate long-term sustainability and applicability across diverse healthcare settings.

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Highlights

What is current knowledge?

- NANDA International Nursing Diagnoses (NANDA-I), Nursing Interventions Classification (NIC), and Nursing Outcomes Classification (NOC) provide a standardized structure for documenting nursing diagnoses, interventions, and outcomes.
- Despite its benefits, the implementation of standardized nursing languages in clinical documentation remains variable across healthcare settings.

What is new here?

- A structured NNN-based training program significantly increased the use of standardized nursing languages in clinical documentation (91.7% vs. 60.0%).
- The intervention improved the documented consistency among nursing diagnoses, interventions, and outcomes within key care domains.

Introduction

Nurses play a central role in healthcare delivery; however, their contributions are often inadequately represented in health information systems because of inconsistent documentation practices and a lack of standardized terminology (1,2). Inadequate documentation may create ambiguity, hinder communication and continuity of care, and limit the ability to demonstrate the measurable effects of nursing interventions (1-3). Therefore, establishing a systematic and consistent framework for describing nursing care is essential for accurately capturing and evaluating its influence on patient outcomes (3).

Standardized Nursing Languages were developed to address this need by providing unified terminology for nursing diagnoses, interventions, and outcomes (4). Their adoption enhances professional communication and supports the systematic evaluation of nursing contributions to care quality and cost-effectiveness (5). Among these systems, NANDA International Nursing Diagnoses (NANDA-I), Nursing Interventions Classification (NIC), and Nursing Outcomes Classification (NOC), collectively known as the NNN framework, provide an integrated structure for care planning, implementation, and outcome evaluation (1,3,4). NANDA-I provides a standardized taxonomy for nursing diagnoses (6,7), whereas NIC and NOC classify interventions and outcomes to enable systematic care delivery and measurable outcome assessment (8,9). However, despite this comprehensive conceptual foundation, the practical effects of these systems depend on their consistent and coordinated application in routine clinical settings.

The NNN framework has been associated with improvements in care quality and the advancement of evidence-based nursing practice (5,10,11). However, effective implementation requires accurate diagnostic reasoning, appropriate intervention selection, and systematic outcome evaluation (10). Despite ongoing educational initiatives,

substantial gaps in knowledge and practical application persist (5,12). A systematic review identified considerable variability in nurses' understanding and use of standardized nursing languages across care settings (13). Similarly, evidence from Asian contexts indicates that the integration of the NNN framework into routine documentation remains limited (14) and that challenges in its accurate application persist despite awareness of its theoretical advantages (15). These findings highlight a persistent discrepancy between the conceptual endorsement of standardized nursing languages and their consistent, sustained use in clinical practice.

Although previous studies have highlighted the theoretical benefits and educational effects of standardized nursing languages, empirical evidence demonstrating whether structured training interventions lead to measurable improvements in routine clinical utilization remains limited, particularly in hospital settings in Vietnam. Objective, documentation-based assessments of implementation effectiveness are scarce. Given the practical constraints of clinical environments and the need to evaluate outcomes under routine conditions, a quasi-experimental design was considered appropriate. This design enables comparison between intervention and control groups while maintaining feasibility within a real-world hospital context. Therefore, this study aimed to determine the effect of a standardized nursing language-based training program on nurses' use of standardized nursing terminology in clinical documentation. The primary outcome was the overall utilization rate of standardized nursing terminology at 3 months post-intervention, and the secondary outcomes were utilization rates across specific terminology domains.

Methods

Study design

A quasi-experimental study was conducted from April to September 2024.

Settings

The study was conducted at Da Nang Hospital, a tertiary hospital in Central Vietnam that comprises 33 clinical departments, six paraclinical departments, and supporting units. At the time of the study, the hospital employed 766 nurses.

Population and sampling

Registered nurses who provided direct patient care, held a bachelor's or postgraduate degree, and had a valid nursing license were eligible. Nurses who were on maternity leave, academic leave, or vacation during the study period were excluded.

The sample size was calculated using a formula for comparing two proportions, based on an expected pre-intervention proportion of 70.9% and a post-intervention proportion of 91.5% (16), with a significance level of $\alpha = 0.05$ and 80% statistical power ($Z^2 = 7.84$). The minimum required sample size was 53 participants per group. After accounting for an anticipated attrition rate of 10%, the target sample size was increased to 58 participants per group. Ultimately, 60 nurses were enrolled in each group, resulting in 120 nurses participating in the study.

For the intervention group, 60 nurses were selected by systematic sampling from a sampling frame of 360 eligible nurses, yielding a sampling interval of six. A random starting number between 1 and 6 was generated using a computer-based randomization procedure, after which every sixth eligible nurse was selected until the required sample size was reached. The control group was recruited separately through convenience sampling. The recruitment of the control group considered the distributions of age, sex, educational level, department, and years of professional experience in the intervention group to improve comparability between the groups. Different sampling approaches were used because the intervention group was selected from the eligible nursing population, whereas control participants were recruited separately based on availability.

Intervention

The intervention comprised a structured training program delivered over one month in two 4-hour sessions. The sessions were facilitated by two nurse educators who held master's degrees in nursing.

The program was organized into two thematic modules aligned with the Nutrition and Safety/Protection domains of the NNN framework. These domains were selected because of their high clinical relevance and frequent occurrence in general hospital settings, thereby enhancing the applicability of the training to routine practice. The first session introduced the conceptual foundations of standardized nursing languages and focused on their application within the Nutrition domain. Participants were trained to identify nursing diagnoses related to ingestion and hydration, select appropriate interventions, and evaluate patient outcomes using standardized indicators. The second session addressed implementation within the Safety/Protection domain, emphasizing diagnoses associated with infection and physical injury, together with the corresponding interventions and outcome-evaluation strategies.

Training materials were developed in accordance with the most recent editions of NANDA-I (6,7), NIC (8), and NOC (9), and were informed by previously published implementation guidance (10). A blended instructional approach was employed, incorporating brief didactic lectures, case-based discussions, and supervised development of nursing care plans to support practical integration into routine clinical documentation.

Intervention fidelity was maintained through the consistent use of standardized teaching materials, including presentation slides, printed handouts, and structured care-plan templates. Attendance was recorded for each session, and participants' comprehension was evaluated through brief knowledge quizzes and structured assessments of care plans completed during training. A detailed description of the training content is provided in Supplementary File 1.

Instruments

Data were collected using a structured three-part instrument developed on the basis of the NANDA-I, NIC, and NOC frameworks (6-9). The first section captured participants' demographic and professional characteristics, including age, gender, educational level, clinical department, and years of professional experience.

The second section evaluated domain-specific utilization of standardized nursing languages within the Nutrition and Safety/Protection domains. The Nutrition domain comprised 11 items (4 nursing diagnoses, 5 interventions, and 2 outcomes), whereas the Safety/Protection domain included 25 items (7 diagnoses, 11 interventions, and 7 outcomes). Each item was scored dichotomously (1 = documented; 0 = not documented). Utilization rates for each domain were calculated as the proportion of documented standardized components relative to the total number of applicable items.

The third section assessed overall utilization of the NNN framework in nursing documentation. Utilization was operationally defined as the documentation of at least one complete nursing care plan incorporating all three standardized components, including a NANDA-I nursing diagnosis, a corresponding NIC intervention, and a related NOC outcome.

The record-review checklist was developed directly from established NANDA-I, NIC, and NOC criteria (6-9) to ensure content validity and alignment with standardized taxonomies. To enhance assessment reliability, two trained nurse evaluators independently reviewed a subset of nursing records. Any scoring discrepancies were resolved through discussion until consensus was reached.

Data collection

Data were collected according to a predefined protocol. Baseline demographic and professional characteristics were obtained before the intervention to assess the comparability of the intervention and control groups.

At the 3-month follow-up, nursing documentation was systematically reviewed to assess nurses' utilization of the NNN framework in clinical documentation. Three nursing records per participant were randomly selected for evaluation. Two trained nurse evaluators who were not involved in delivering the intervention and were blinded to group allocation independently reviewed the selected records using a standardized assessment checklist to minimize assessment bias. To reduce the risk of contamination within the shared hospital environment, documentation from the control group was reviewed before documentation from the intervention group. The data collection process was completed within a one-month period.

Data analysis

Statistical analyses were performed using SPSS version 20.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics were used to summarize participants' demographic and professional characteristics and report the utilization rates of the NNN framework.

Because the primary and secondary outcomes were categorical variables, differences in post-intervention utilization rates between the intervention and control groups were analyzed using the chi-square test or Fisher's exact test, as appropriate. Risk ratios (RRs) with 95% confidence intervals (CIs) were calculated to estimate the magnitude of the between-group differences. All statistical tests were two-sided, and a p-value < 0.05 was considered statistically significant.

Results

Characteristics of the participants

Data completeness was assessed before analysis, and data for all variables of interest were available for all 120 nurses. Therefore, all participants were included in the final analysis. As shown in Table 1, the baseline demographic and professional characteristics were comparable between the intervention and control groups, with no statistically significant differences (all p > 0.05).

Utilization of NANDA-I diagnoses, NIC interventions, and NOC outcomes in nursing documentation

As shown in Table 2, significant between-group differences were observed in the utilization of the NNN framework within the Nutrition domain at the 3-month follow-up. Nurses in the intervention group had significantly higher documentation rates for NANDA-I diagnoses related to imbalanced nutrition, deficient fluid volume, and risk of deficient fluid volume than nurses in the control group (All p < 0.05). Similarly, the intervention group demonstrated significantly higher utilization of the nutrition management and fluid management interventions (both p < 0.01) and the NOC outcome of fluid balance (p < 0.001).

Within the Safety/Protection domain, the intervention group demonstrated significantly higher utilization of NANDA-I diagnoses, including impaired tissue integrity, risk of impaired tissue integrity, risk of aspiration, and risk of bleeding (p < 0.05). Of the 11 NIC interventions evaluated, six were utilized significantly more frequently in the intervention group, including medication management, wound care, skin care, pressure management, patient education, and emotional support and counseling (p < 0.05). Four NOC outcomes, including infection prevention knowledge, risk control, tissue integrity, and nutritional status, also demonstrated significantly higher utilization in the intervention group (Table 3).

The RRs for statistically significant outcomes ranged from 1.20 to 1.72. In the Nutrition domain, the RRs ranged from 1.26 for deficient fluid volume to 1.72 for fluid management. In the Safety/Protection domain, the RRs ranged from 1.20 for risk of impaired tissue integrity and emotional support and counseling to 1.49 for patient education. All corresponding 95% CIs were above 1.00, indicating a greater likelihood of documented NNN utilization in the intervention group (Table 4).

Table 1. Baseline characteristics of nurses in the intervention and control groups (N=120)

Characteristics	Control group n (%)	Intervention group n (%)	P-value
Age			
< 30 years	23 (38.3)	23 (38.3)	1.000**
30 - 50 years	36 (60.0)	36 (60.0)	
> 50 years	1 (1.7)	1 (1.7)	
Gender			
Male	4 (6.7)	4 (6.7)	1.000**
Female	56 (93.3)	56 (93.3)	
Educational level			
Bachelor of nursing	57 (95.0)	57 (95.0)	1.000**
Postgraduate	3 (5.0)	3 (5.0)	
Department			
Internal medicine departments	19 (31.7)	20 (33.3)	0.996*
Surgical departments	14 (23.3)	14 (23.3)	
Emergency resuscitation departments	13 (21.7)	13 (21.7)	
Other departments	14 (23.3)	13 (21.7)	
Years of working experience			
≤ 10 years	39 (65.0)	39 (65.0)	1.000*
> 10 years	21 (35.0)	21 (35.0)	

*Chi-Square Test; **Fisher's Exact Test

Table 2. Post-intervention utilization of the NNN framework in the Nutrition domain

Content	Control group (N=60)		Intervention group (N=60)		P-value
	Documented n (%)	Not Documented n (%)	Documented n (%)	Not Documented n (%)	
NANDA-I Diagnosis					
Imbalanced nutrition	40 (66.7)	20 (33.3)	55 (91.7)	5 (8.3)	**< 0.001***
Impaired swallowing	45 (75.0)	15 (25.0)	52 (86.7)	8 (13.3)	0.104*
Deficient fluid volume	39 (65.0)	21 (35.0)	49 (81.7)	11 (18.3)	**0.039***
Risk of deficient fluid volume	31 (51.7)	29 (48.3)	45 (75.0)	15 (25.0)	**0.008***
NIC					
Enteral tube feeding	45 (75.0)	15 (25.0)	50 (83.3)	10 (16.7)	0.261*
Nutritional counseling	49 (81.7)	11 (18.3)	50 (83.3)	10 (16.7)	0.810*
Nutrition management	41 (68.3)	19 (31.7)	53 (88.3)	7 (11.7)	**0.008***
Swallowing safety education	44 (73.3)	16 (26.7)	50 (83.3)	10 (16.7)	0.184*
Fluid management	29 (48.3)	31 (51.7)	50 (83.3)	10 (16.7)	**< 0.001***
NOC					
Nutritional intake	47 (78.3)	13 (21.7)	54 (90.0)	6 (10.0)	0.080*
Fluid balance	36 (60.0)	24 (40.0)	52 (86.7)	8 (13.3)	**< 0.001***

*Chi-Square Test

NNN = NANDA International Nursing Diagnoses, Nursing Interventions Classification, Nursing Outcomes Classification; NIC = Nursing Interventions Classification; NOC = Nursing Outcomes Classification

Table 3. Post-intervention utilization of the NNN framework in the Safety/Protection domain

Content	Control group (N=60)		Intervention group (N=60)		P-value
	Documented n (%)	Not Documented n (%)	Documented n (%)	Not Documented n (%)	
NANDA-I Diagnosis					
Risk of infection	48 (80.0)	12 (20.0)	55 (91.7)	5 (8.3)	0.114*
Impaired tissue integrity	45 (75.0)	15 (25.0)	55 (91.7)	5 (8.3)	**0.026***
Impaired skin integrity	53 (88.3)	7 (11.7)	55 (91.7)	5 (8.3)	0.762*
Risk of impaired tissue integrity	45 (75.0)	15 (25.0)	54 (90.0)	6 (10.0)	**0.031***
Risk of impaired skin integrity	39 (65.0)	21 (35.0)	44 (77.3)	16 (26.7)	0.323*
Risk of aspiration	41 (68.3)	19 (31.7)	51 (85.0)	9 (15.0)	**0.031***
Risk of bleeding	40 (66.7)	20 (33.3)	53 (88.3)	7 (11.7)	**0.004***
NIC					
Medication management	42 (70.0)	18 (30.0)	54 (90.0)	6 (10.0)	**0.006***
Educating patients on infection prevention	47 (78.3)	13 (21.7)	48 (80.0)	12 (20.0)	0.822*
Wound care	37 (61.7)	23 (38.3)	49 (81.7)	11 (18.3)	**0.015***
Edema control	44 (73.3)	16 (26.7)	50 (83.3)	10 (16.7)	0.184*
Skin care	38 (63.3)	22 (36.7)	51 (85.0)	9 (15.0)	**0.007***
Pressure management	35 (58.3)	25 (41.7)	50 (83.3)	10 (16.7)	**0.003***
Nutritional management	49 (81.7)	11 (18.3)	52 (86.7)	8 (13.3)	0.453*
Patient education	35 (58.3)	25 (41.7)	52 (86.7)	8 (13.3)	**< 0.001***
Feeding techniques	41 (68.3)	19 (31.7)	48 (80.0)	12 (20.0)	0.144*
Emotional support and counseling	45 (75.0)	15 (25.0)	54 (90.0)	6 (10.0)	**0.031***
Patient education on bleeding precautions	48 (80.0)	12 (20.0)	53 (88.3)	7 (11.7)	0.211*
NOC					
Infection prevention knowledge	38 (63.3)	22 (36.7)	51 (85.0)	9 (15.0)	**0.007***
Risk control	40 (66.7)	20 (33.3)	53 (88.3)	7 (11.7)	**0.004***
Tissue integrity	43 (71.7)	17 (28.3)	55 (91.7)	5 (8.3)	**0.005***
Nutritional status	41 (68.3)	19 (31.7)	54 (90.0)	6 (10.0)	**0.003***
Mobility	50 (83.3)	10 (16.7)	55 (91.7)	5 (8.3)	0.168*
Comfort level	48 (80.0)	12 (20.0)	54 (90.0)	6 (10.0)	0.125*
Self-management behaviors	47 (78.3)	13 (21.7)	53 (88.3)	7 (11.7)	0.142*

*Chi-Square Test

NNN = NANDA International Nursing Diagnoses, Nursing Interventions Classification, Nursing Outcomes Classification; NIC = Nursing Interventions Classification; NOC = Nursing Outcomes Classification

Table 4. Risk ratios for selected NANDA-I diagnoses, NIC interventions, and NOC outcomes at 3-month follow-up

Outcome	RR	95% CI	P-value
NANDA-I Diagnoses - Nutrition			
Imbalanced nutrition	1.38	1.13-1.67	< 0.001
Deficient fluid volume	1.26	1.01-1.57	0.039
Risk of deficient fluid volume	1.45	1.09-1.93	0.008
NICs - Nutrition			
Nutrition management	1.29	1.06-1.57	0.008
Fluid management	1.72	1.30-2.29	< 0.001
NOCs - Nutrition			
Fluid balance	1.44	1.15-1.82	< 0.001
NANDA-I diagnoses - Safety/Protection			
Impaired tissue integrity	1.22	1.04-1.44	0.026
Risk of impaired tissue integrity	1.20	1.01-1.42	0.031
Risk of aspiration	1.24	1.02-1.52	0.031
Risk of bleeding	1.33	1.08-1.62	0.004
NICs- Safety/Protection			
Medication management	1.29	1.07-1.55	0.006
Wound care	1.32	1.05-1.67	0.015
Skin care	1.34	1.08-1.67	0.007
Pressure management	1.43	1.12-1.82	0.003
Patient education	1.49	1.17-1.88	< 0.001
Emotional support and counseling	1.20	1.01-1.42	0.031
NOCs - Safety/Protection			
Infection prevention knowledge	1.34	1.08-1.67	0.007
Risk control	1.33	1.08-1.62	0.004
Tissue integrity	1.28	1.07-1.53	0.005
Nutritional status	1.32	1.09-1.60	0.003

RR = Risk Ratio; CI = Confidence Interval

Post-intervention utilization of the NNN framework by group

At the 3-month follow-up, the use of NNN terminology in clinical documentation was significantly higher in the intervention group than in the control group (91.7% vs. 60.0%, respectively; $\chi^2 = 16.32$, df = 1, $p < 0.001$).

Discussion

The primary finding of this study was a statistically significant increase in the overall utilization of the NNN framework following the structured training intervention. At the 3-month follow-up, nurses in the intervention group demonstrated greater utilization of standardized nursing diagnoses, interventions, and outcomes in clinical documentation than nurses in the control group. Systematic nursing care processes are important for supporting patient safety and quality of care (17). The findings suggest that targeted NNN-based education may support the routine use of standardized nursing languages and improve the clarity, consistency, and measurability of nursing documentation (5,13).

The increase in overall NNN utilization is consistent with previous research on structured terminology training. A previous study reported increased NNN-based documentation following targeted education, whereas no comparable improvement was observed in the control group (18). Similarly, a systematic review found that standardized nursing processes based on the NNN framework can support clinical decision-making and nursing-sensitive outcomes (12). Beyond documentation completeness, the coordinated use of NANDA-I, NIC, and NOC may facilitate a more transparent evaluation of nursing care and support professional accountability (3,5). The present findings add to the limited empirical evidence on NNN implementation in Vietnamese hospital settings and suggest that structured NNN-based education may be feasible in routine clinical practice. However, the findings should be interpreted cautiously given the nonrandomized design and the possibility of residual confounding.

Regarding the secondary outcomes, statistically significant between-group differences were observed in several indicators within the Nutrition domain. Nurses in the intervention group more frequently documented NANDA-I diagnoses related to imbalanced nutrition and fluid-volume disturbances, together with the corresponding NIC interventions and NOC outcomes. The consistent use of diagnoses, interventions, and outcomes may reflect greater alignment among assessment, intervention selection, and outcome evaluation. These findings are broadly consistent with previous evidence suggesting that NOC-guided implementation and structured NNN linkages can support outcome-oriented care planning for patients with nutritional problems (12,19). Previous studies have also reported improvements in diagnostic accuracy and documentation quality following NNN-focused education (12,18,20). Nevertheless, because multiple outcomes were examined, these findings should be interpreted cautiously and in the context of the potential for type I error.

Similar patterns were observed in the Safety/Protection domain. The intervention group demonstrated greater utilization of NANDA-I diagnoses related to tissue integrity, aspiration risk, and bleeding risk, together with the corresponding NIC interventions and NOC outcomes. These findings may indicate greater use of standardized terminology to document patient safety risks and related nursing care. International studies have reported frequent use of diagnoses such as risk for impaired skin integrity in nursing home settings (21) and increased utilization of diagnoses and interventions related to tissue integrity following NNN-focused training (22). Korean research has also reported the use of NIC interventions such as medication management and emotional support, together with NOC outcomes related to nutritional status, risk management, and tissue integrity (21). Although evidence evaluating the NNN framework specifically within the Safety/Protection domain remains limited, the current findings are generally consistent with previous reports. However, the observed associations should not be interpreted as evidence of improved clinical judgment or patient outcomes because the present study evaluated the utilization of documentation rather than direct clinical performance or patient outcomes.

Several contextual factors should be considered when interpreting these findings. Improvements in both groups may partly reflect a Hawthorne effect, whereby participants modify their behavior because they are aware of being observed (23). Because the participants worked within the same institution, the informal exchange of information about the NNN framework may also have contributed to improvements in the control group and reduced the between-group difference. Organizational factors, including managerial encouragement, peer support, and motivation associated with research participation, may have further influenced documentation practices (5,24). In addition, structural constraints, such as workload, staffing limitations, and limited integration of standardized terminology into electronic documentation systems, may affect the sustained implementation of the NNN framework in Vietnamese hospitals. These considerations highlight the importance of continued institutional support, leadership engagement, and the integration of standardized nursing languages into electronic health records to support sustainable documentation practices and interoperability across healthcare systems (25,26).

Several methodological limitations should be acknowledged. First, the study was nonrandomized. Although control participants were matched 1:1 on selected demographic and professional characteristics, the matched design was not explicitly accounted for in the analysis, and no multivariable adjustment was performed; therefore, residual or unmeasured confounding cannot be excluded. In addition, the intervention and control groups were recruited using different sampling approaches, with systematic sampling used for the intervention group and convenience sampling used for the control group. Although matching was performed to improve comparability based on selected observed characteristics, convenience sampling of the control group may have introduced selection bias, and unmeasured differences, such as motivation or baseline performance, may have persisted between the groups. Second, the absence of pre-intervention NNN utilization data limited the assessment of baseline differences and changes over time. Third, multiple comparisons across NANDA-I diagnoses, NIC interventions, and NOC outcomes were conducted without formal adjustment, increasing the potential risk of type I error. Fourth, the analysis was limited to the Nutrition and Safety/Protection domains, which may restrict generalizability. Fifth, the 3-month follow-up did not permit an assessment of long-term sustainability. Finally, NNN utilization was assessed on the basis of documented NNN care plans without evaluating the accuracy, appropriateness, or overall quality and completeness of the terminology. Therefore, greater utilization should not be interpreted as evidence of improved clinical competence or patient outcomes.

Future studies should evaluate additional nursing domains and use validated instruments to assess the accuracy, appropriateness, and completeness of NNN-based documentation. Longer follow-up periods are needed to assess the sustainability of changes in documentation practices, whereas multicenter studies across diverse hospital settings could improve the generalizability of the findings. Larger studies incorporating appropriate multivariable analyses may provide more robust estimates and further clarify the factors associated with NNN utilization.

Conclusion

This study found that a structured NNN-based training program was associated with increased utilization of standardized nursing diagnoses, interventions, and outcomes in clinical documentation, particularly within the Nutrition and Safety/Protection domains studied. The findings suggest that targeted training may support the adoption of standardized nursing languages in routine documentation within these clinical domains. However, given the nonrandomized design and other methodological limitations, these findings should be interpreted cautiously. Because the training and assessment were limited to the Nutrition and Safety/Protection domains, the findings cannot be generalized to NNN utilization across all areas of nursing documentation. Further research is needed to determine whether increased NNN utilization is sustained over time, translates into improvements in documentation quality and clinical practice, and can be effectively implemented across other NNN domains.

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Ethical Statement

Ethical approval was obtained from Da Nang Hospital before the study was initiated (Reference #762/BVĐN-KHTH dated 11 April 2024). All participants received detailed information about the study objectives and procedures, and written informed consent was obtained before enrollment. Participation was voluntary, and the confidentiality of all collected data was strictly maintained throughout the study.

Conflicts of Interest

The authors declare no conflicts of interest.

Author Contributions

Conception: T.T.L., L.T.T., N.T.P.; Design: T.T.L., L.T.T., N.T.P., N.T.Y.H.; Supervision: T.T.L., N.T.P.; Data Collection: N.T.P., T.T.T.H., V.T.H.T; Analysis and Interpretation: T.T.L., L.T.T., N.T.Y.H.; Literature Search: T.T.T.H., V.T.H.T., N.T.Y.H.; Manuscript Writing: T.T.L., L.T.T., T.T.T.H., V.T.H.T., N.T.Y.H.; Critical Review: T.T.L., L.T.T.

Data Availability Statement

The datasets generated and/or analyzed during the current study are available from the corresponding author upon reasonable request.

Use of Artificial Intelligence

Artificial intelligence (AI) tools were used only for language editing and proofreading. The authors reviewed and verified all AI-assisted content and take full responsibility for the accuracy, integrity, and originality of the manuscript.

References

1. Omonigho OP. Evaluation of the use of NANDA-I nursing diagnoses, Nursing Outcome Classification and Nursing Intervention Classification for documentation of care in primary health centres, Ijebu Ode. Texila Int J Nurs. 2019;5(1):1-13. [View at Publisher] [DOI]
2. Dos Santos FC, D'Agostino F, Härkönen M, Nantschev R, Christensen B, Müller-Staub M, et al. Improving the quality of nursing care through standardized nursing languages: Call to action across European countries. Int J Med Inform. 2024;192:105627. [View at Publisher] [DOI] [PMID] [Google Scholar]
3. Eray K, Oflaz F. An investigation of the use of the NANDA NIC NOC system in psychiatric nursing. J Psy Nurs. 2023;14(3):270-9. [View at Publisher] [DOI] [Google Scholar]
4. Fennelly O, Grogan L, Reed A, Hardiker NR. Use of standardized terminologies in clinical practice: A scoping review. Int J Med Inform. 2021;149:104431. [View at Publisher] [DOI] [PMID] [Google Scholar]
5. Chae S, Oh H, Moorhead S. Effectiveness of nursing interventions using standardized nursing terminologies: An integrative review. West J Nurs Res. 2020;42(11):963-73. [View at Publisher] [DOI] [PMID] [Google Scholar]
6. NANDA International, Inc. Nursing diagnoses: Definitions and classification 2024-2026. 13th ed. New York (NY): Thieme; 2024. [View at Publisher]
7. Herdman TH, Kamitsuru S, Lopes CT. NANDA International nursing diagnoses: Definitions and classification 2021-2023. 12th ed. New York (NY): Thieme; 2021. [View at Publisher] [DOI]
8. Wagner CM, Butcher HK, Clarke MF. Nursing interventions classification (NIC). 8th ed. St. Louis (MO): Elsevier; 2023. [View at Publisher] [Google Scholar]
9. Moorhead S, Swanson E, Johnson M, editors. Nursing outcomes classification (NOC): Measurement of health outcomes. 7th ed. St. Louis (MO): Elsevier; 2024. [View at Publisher] [Google Scholar]
10. Duan X, Ding Y, Ning Y, Luo M. Application of NANDA-I nursing diagnoses, Nursing Interventions Classification and Nursing Outcomes Classification in research and practice of cardiac rehabilitation nursing: A scoping review. Int J Nurs Knowl. 2024;35(3):256-71. [View at Publisher] [DOI] [PMID] [Google Scholar]
11. Giap TTT, Park M, Bui LK. A comprehensive picture of using standardized nursing languages in long-term care systems: An integrative review. Int J Nurs Knowl. 2025;36(2):193-208. [View at Publisher] [DOI] [PMID] [Google Scholar]
12. Rodríguez-Suárez CA, González-de la Torre H, Hernández-de Luis MN, Fernández-Gutiérrez DÁ, Martínez-Alberto CE, Brito-Brito PR. Effectiveness of a standardized nursing process using NANDA International, Nursing Interventions Classification and Nursing Outcomes Classification terminologies: A systematic review. Healthcare (Basel). 2023;11(17):2449. [View at Publisher] [DOI] [PMID] [Google Scholar]
13. Wahyuni ED, Nursalam N, Setiya Dewi Y. Standardized nursing language application in diverse nursing practice and documentation settings. J Keperawatan Glob. 2023;8(2):80-95. [View at Publisher] [DOI] [Google Scholar]
14. Shin JH, Jung SO, Lee JS. Identification of NANDA-NIC-NOC of nursing home residents using on-time data by android smartphone application. Int J Nurs Knowl. 2024;35(1):46-68. [View at Publisher] [DOI] [PMID] [Google Scholar]
15. Somantri I, Sekarwana N, Mediawati AS, Ramoo V, Yahaya NA, Yudianto K. Analysis of standardized nursing language application in nursing diagnosis in hospitals in Indonesia. Open Access Maced J Med Sci. 2021;9(T6):173-8. [View at Publisher] [DOI]
16. Özkan ÇG, Kurt Y, Bayram SB, Bayrak B, Kılınç KO. The effect of group-focused case study on NANDA-I nursing diagnosis identification and perception in nursing students. Clin Exp Health Sci. 2020;10:256-64. [View at Publisher] [Google Scholar]
17. Phillips J, Malliaris AP, Bakerjian D. Nursing and patient safety. Rockville (MD): Agency for Healthcare Research and Quality; 2021. [View at Publisher] [Google Scholar]
18. Taghavi Larijani T, Saatchi B. Training of NANDA-I nursing diagnoses, Nursing Interventions Classification and Nursing Outcomes Classification in psychiatric wards: A randomized controlled trial. Nurs Open. 2019;6(2):612-9. [View at Publisher] [DOI] [PMID] [Google Scholar]
19. Monteiro Mantovani V, Moorhead S, Abe N. NANDA-I, NOC, and NIC linkages for nutritional problems. Int J Nurs Knowl. 2020;31(4):246-52. [View at Publisher] [DOI] [PMID] [Google Scholar]
20. Setyaningrum EE, Nurjannah I, Rustiyaningsih A. Effect of NANDA-I, NIC, and NOC documentation system training on quality of nursing care documentation in a perinatal ward. Belitung Nurs J. 2019;5(5):180-91. [View at Publisher] [DOI] [Google Scholar]
21. Shin JH, Choi GY, Lee J. Identifying frequently used NANDA-I nursing diagnoses, NOC outcomes, NIC interventions, and NNN linkages for nursing home residents in Korea. Int J Environ Res Public Health. 2021;18(21):11505. [View at Publisher] [DOI] [PMID] [Google Scholar]
22. Bebiş H, Moorhead S, Gençbaş D, Özdemir S, Seven M. NOC/NIC linkages to NANDA-I for continence care of elderly people with urinary incontinence in nursing homes: A systematic review. Florence Nightingale Hemsire Derg. 2019;27(3):284-303. [View at Publisher] [DOI] [PMID] [Google Scholar]
23. Choi WJ, Jung J, Grantcharov T. Impact of the Hawthorne effect on healthcare professionals: A systematic review. Univ Tor Med J. 2019;96:21-32. [View at Publisher] [Google Scholar]
24. Kamarova S, Gagné M, Holtrop D, Dunlop PD. Integrating behavior and organizational change literatures to uncover crucial psychological mechanisms underlying the adoption and maintenance of organizational change. J Organ Behav. 2025;46(2):263-87. [View at Publisher] [DOI] [Google Scholar]

25. Bertocchi L, Petrucci C, Masotta V, Marcotullio A, Jones D, Lancia L, et al. Standardized nursing terminologies and electronic health records: A secondary analysis of a systematic review. Healthcare (Basel). 2025;13(16):1952. [View at Publisher] [DOI] [PMID] [Google Scholar]

26. Porcel Gálvez A-M, Lima-Serrano M, Allande-Cussó R, Costanzo-Talarico M-G, García M-DM, Bueno-Ferrán M, et al. Enhancing nursing care through technology and standardized nursing language: The TEC-MED multilingual platform. Int J Nurs Knowl. 2025;36(4):421-9. [View at Publisher] [DOI] [PMID] [Google Scholar]

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Supplementary File 1. Details of the training intervention

Section	Training content
The 1st section	(1) Introduce the training program (2) Overview of NANDA-I Diagnoses, NOC, and NIC (3) NANDA-I Diagnoses, NOC, and NIC for the Nutrition domain
	- Nursing diagnoses used for the "Ingestion" class • Imbalanced nutrition • Impaired swallowing - Nursing diagnoses used for the "Hydration" class • Deficient fluid volume • Risk of deficient fluid volume
	- Nursing interventions used for the "Ingestion" class • Enteral tube feeding • Nutritional counseling • Nutrition management • Swallowing safety education - Nursing interventions used for the "Hydration" class • Fluid management
	- Nursing outcomes used for the "Ingestion" class • Nutritional intake
	- Nursing outcomes used for the "Hydration" class • Fluid balance
The 2nd section	NANDA-I diagnoses, NOC, and NIC for the Safety/Protection domain
	- Nursing diagnoses used for the "Infection" class • Risk of infection - Nursing diagnoses used for the "Physical injury" class • Impaired tissue integrity • Impaired skin integrity • Risk of impaired tissue integrity • Risk of impaired skin integrity • Risk of aspiration • Risk of bleeding
	- Nursing interventions used for the "Infection" class • Medication management • Educating patients on infection prevention - Nursing interventions used for the "Physical injury" class • Wound care • Edema control • Skin care • Pressure management • Nutritional management • Patient education • Feeding techniques • Emotional support and counseling • Patient education on bleeding precautions
	- Nursing outcomes used for the "Infection" class • Infection prevention knowledge • Risk control - Nursing outcomes used for the "Physical injury" class • Tissue integrity • Nutritional status • Mobility • Comfortable level • Self-management behaviors