



Systematic Review

Standardized Nursing Language (SNL) Application in Diverse Nursing Practice and Documentation Settings

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ABSTRACT

Background: Effective communication in healthcare is crucial, and Standardized Nursing Language (SNL) has emerged as a powerful tool to enhance nursing practice and documentation. However, disparities in SNL awareness and knowledge pose challenges to its effective implementation. This systematic review aims to synthesize research on SNL application in nursing practice across diverse settings, utilizing a comprehensive database search and predefined criteria for study selection.

Methods: Comprehensive searches were conducted across databases like PubMed, Scopus, ProQuest, and Web of Science. This systematic review adhered to the updated guidelines provided by PRISMA 2020. Three independent reviewers assessed study eligibility based on predefined criteria, resolving discrepancies through discussion. A narrative synthesis approach categorized and thematically analyzed the data, focusing on SNL's impact in diverse healthcare settings. Data was retrieved after the studies were subjected to quality assessment and risk of biases.

Results: The review included twelve studies spanning various healthcare systems and regions. While SNL demonstrated potential benefits, disparities in awareness, knowledge, and utilization were evident among participants. Challenges such as complex documentation processes and feasibility concerns were raised.

Conclusion: SNL plays a pivotal role in enhancing nursing practice, improving documentation, and facilitating effective communication. Addressing education gaps and providing ongoing training opportunities are essential to overcome implementation challenges. Collaboration among healthcare institutions, educators, and regulatory bodies is crucial to fully leveraging SNL's benefits for better patient care and healthcare outcomes.

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INTRODUCTION

In contemporary healthcare landscapes, the application of Standardized Nursing Language (SNL) stands as a focal point in enhancing nursing practice and documentation across varied settings. As healthcare systems evolve and diversify, the efficacy and adaptability of SNL in catering to the nuances of diverse nursing practice settings warrant meticulous examination (Iyabode, 2017; Oreofe & Oyenike, 2018).

Effective healthcare communication stands as a linchpin in ensuring optimal patient care. Nurses, in their pivotal role as liaisons between patients and healthcare providers, wield the responsibility of translating clinical data into actionable insights. The precision in this process profoundly influences outcomes. Within this landscape, the emergence of Standardized Nursing Language (SNL) as a potent tool, particularly in care planning, warrants deeper investigation (Johnson et al., 2018).

The recognition and significance of SNL in nursing practice have gained traction. It offers standardized terms that facilitate consistent sharing of patient information across healthcare settings, thereby enhancing the clarity of documentation, clinical decision-making, quality assurance, and research efforts. In the contemporary healthcare milieu where electronic health records prevail, the systematic integration of nursing classification systems and standardized language holds pivotal importance (Johnson et al., 2018).

While Standardized Nursing Language (SNL) has shown promise in facilitating effective communication across diverse healthcare settings and improving patient care, its widespread adoption and practical application encounter multifaceted challenges. Researchers such as Thoroddsen et al., (2010) have highlighted SNL's ability to differentiate between specialties, illustrating its potential to transcend geographical limitations (Thoroddsen et al., 2010). Moreover, studies by Ojo & Olaogun (2022) demonstrate the positive impact of consistent training in standardized nursing languages, coupled with staff motivation and increased staffing, on documentation quality and patient care. However, despite these promising outcomes, SNL's integration into nursing practice faces intricate hurdles (Ojo & Olaogun, 2022).

Resistance to change, varying interpretations, and the necessity for ongoing education emerge as significant challenges that hinder SNL from becoming a pragmatic and invaluable tool for nurses. While SNL is upheld as the gold standard, its utilization remains suboptimal. Enebeli, Akpan-Idiok, et al., (2022) shed light on obstacles faced by nurses, such as difficulty in formulating precise nursing diagnoses, staffing shortages, time constraints, inadequate resources, and insufficient knowledge of NOC and NIC.

These challenges significantly impede the effective utilization of SNL (Enebeli, Akpan-Idiok, et al., 2022). It's important to appreciate the efforts showcased by Thoroddsen et al., (2010) and Ojo & Olaogun, (2022) in demonstrating SNL's potential and the positive outcomes associated with training initiatives. However, these studies also accentuate the complex nature of the challenges facing SNL's practical implementation in nursing practice (Ojo & Olaogun, 2022; Thoroddsen et al., 2010).

This systematic review endeavors to explore the application of SNL in nursing practice and documentation across diverse settings. It aims to synthesize existing research, unveiling the current state of adoption, impact, and challenges within healthcare. Our objective is to provide insights that foster effective SNL utilization, ultimately enhancing patient care and global collaboration. In the ensuing sections, we shall delve into the historical context, framework, methodologies, and outcomes

pertinent to SNL. This review seeks to contribute to the ongoing discourse on the integration of SNL in nursing practice.

MATERIALS AND METHOD

Design

This systematic review adhered to the updated guidelines provided by PRISMA 2020 when reporting its findings (Page et al., 2021).

Search Strategy

We conducted a comprehensive search of electronic databases, including PubMed, Scopus, ProQuest, and Web of Science. No date restrictions were imposed on the search. The last search was performed on September 6, 2023. The search was guided by the following keywords and Medical Subject Heading (MeSH) terms: "standardized nursing language," "nursing documentation," "nursing diagnosis," "nursing interventions," "nursing outcomes," and related synonyms. We also manually searched the reference lists of selected studies to identify additional relevant sources.

Study Selection

Three independent reviewers assessed the eligibility of studies based on predefined inclusion criteria: quantitative research studies, studies focusing on the application and impact of Standardized Nursing Language (SNL) in healthcare settings, studies addressing nursing documentation, diagnosis, interventions, and outcomes, and open-access studies. The exclusion criteria included review studies (literature reviews or systematic reviews) and studies that did not report on SNL. Any discrepancies in study selection among the reviewers were resolved through discussion, and a consensus was reached.

Data Extraction and Synthesis

Data from the selected studies were systematically extracted, including study characteristics (e.g., author, publication year), study design, healthcare setting, and outcomes related to nursing documentation, diagnosis, interventions, and outcomes. A narrative synthesis approach was employed to summarize the findings of the included studies. The data were categorized and analyzed thematically, with a particular focus on the impact of SNL in diverse healthcare settings and its influence on nursing practice, documentation, diagnosis, interventions, and outcomes.

Study Quality Assessment

The quality of the included articles was assessed using the STROBE statement for cross-sectional studies. Three reviewers independently evaluated each article and reached a consensus through discussion. The evaluation covered various aspects, including the article's sections, research framework, and suitability for inclusion based on STROBE criteria. A binary 'yes/no' approach was used for appraisal, and discussions on article significance and quality were frequent. The assessment tool had 22 questions addressing study components and potential biases. Table 3 summarizes the quality assessment data.

RESULTS

Search Results

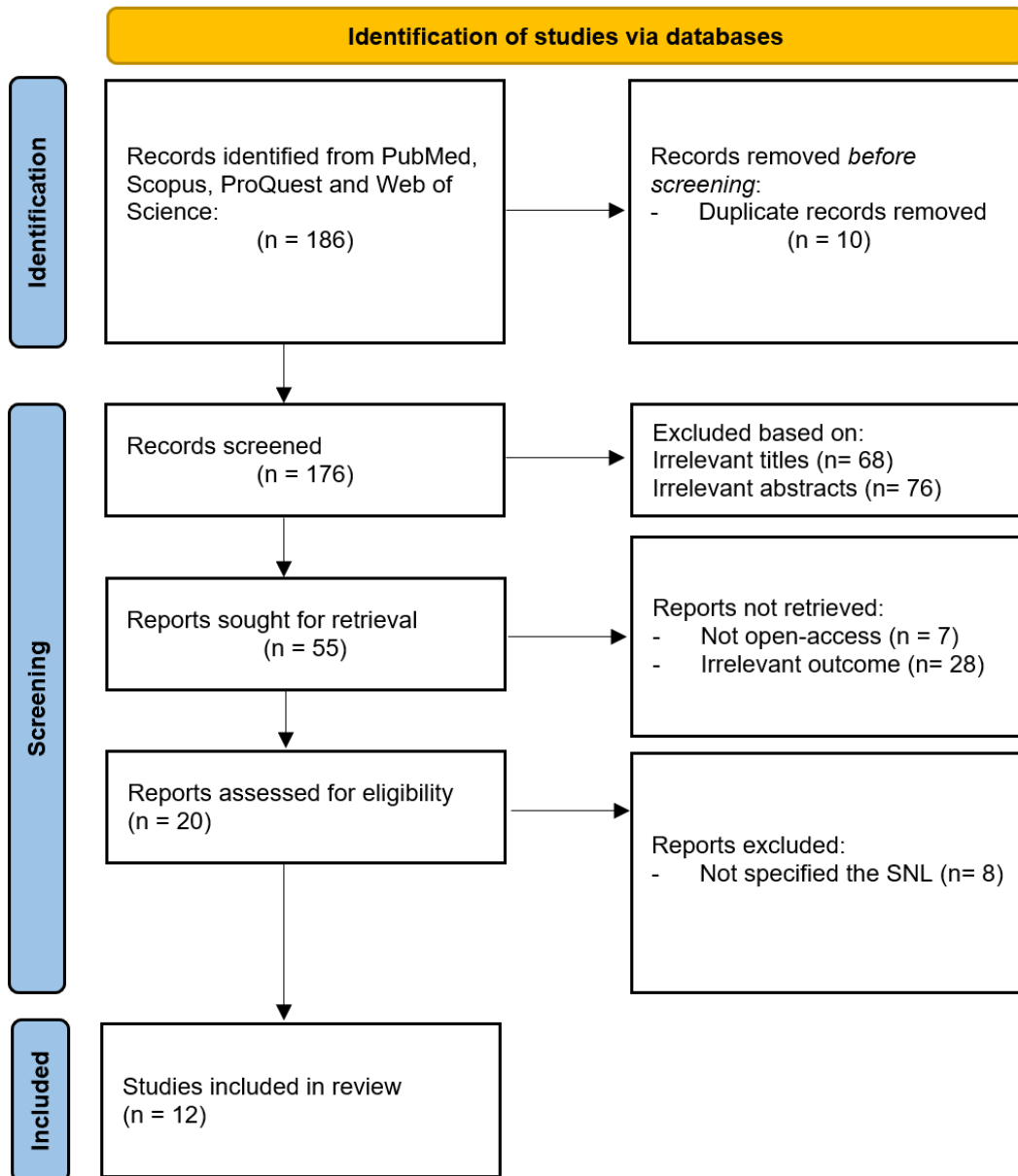


Figure 1. Diagram Flow literature search

In Figure 1, there were initially 186 articles identified from the databases. Before the removal of duplicates, this number had been reduced to 176 articles, which were subjected to screening based on their titles and abstracts. Following this screening, 55 studies had been identified as potentially relevant after excluding those with irrelevant titles and abstracts. Subsequently, a more in-depth assessment of 20 studies was conducted to determine their eligibility, considering factors such as study methods, participants, accessibility, and the discussion within the studies. Ultimately, 12 studies had met the inclusion criteria and had been included in the review.

Study Characteristics

A total of nine articles were included in this systematic review, each contributing valuable insights into the application and impact of Standardized Nursing Language (SNL) across diverse settings (Table 1). This review included different geographical regions and spanned healthcare systems at varying stages of development, including Nigeria, Indonesia, Italy, Brazil, Spain, and Korea.

Education and Training in SNL

The studies conducted shed light on the awareness, knowledge, and utilization of Standardized Nursing Language (SNL) among participants. While certain studies revealed a notable degree of awareness, particularly among nursing students, disparities surfaced in participants' comprehension of SNL components. Moreover, inconsistencies emerged in SNL utilization, with some acknowledging regular use and others lacking consistent implementation in their practice (Adubi et al., 2018; Ojo et al., 2020; Olatubi et al., 2019).

The need for education and training to maximize the effectiveness of SNL among nurses in both Nigerian and Catalan studies became evident due to limited knowledge and familiarity with SNL components like the Nursing Outcomes Classification (NOC) and the Nursing Interventions Classification (NIC). Investing in seminars and training programs emerged as a viable solution to bridge knowledge gaps and bolster confidence in SNL usage (Adereti & Olaogun, 2019; Enebeli, Akpan-Idiok, et al., 2022; Rios Jimenez et al., 2020).

Application of SNL in Clinical Practice

Standardized Nursing Language (SNL) has showcased extensive applicability across various clinical scenarios. It has effectively delineated the sociodemographic and clinical profiles of highly complex chronic patients (HCCPs), aiding in comprehensive health pattern assessments (Brito-Brito et al., 2022). In perioperative care, SNL highlighted disparities, emphasizing the crucial need for standardization in nursing practices (Widodo et al., 2020). Additionally, SNL has proven instrumental in describing Nursing Home (NH) residents' characteristics and identifying prevalent nursing diagnoses, outcomes, and interventions, offering invaluable insights into their care requirements (Shin et al., 2021).

Moreover, SNL's role in nursing diagnoses, planned outcomes, and interventions has been pivotal in ensuring uniformity and precision in patient care. It facilitated correlations within healthcare patterns, diagnoses, and interventions, improving the accuracy of nursing diagnoses and taxonomy analysis (Aleandri et al., 2022; Silva et al., 2022; Somantri et al., 2021).

Improving SNL Application in Clinical Practice

Barriers hindering effective SNL utilization, such as staff shortages and resource limitations, call for clear usage policies and embracing electronic documentation like electronic health records (EHRs). A holistic approach, addressing educational gaps and providing support, is pivotal in overcoming these barriers and enhancing nursing practices (Adereti & Olaogun, 2019; Enebeli, Akpan-Idiok, et al., 2022; Rios Jimenez et al., 2020).

Implications and Synthesis

The study's outcome suggests the utilization of various standardized nursing languages (SNL), including NANDA-I, NIC, NOC, NNN, SDKI, SLKI, and SIKI, in nursing practice across different healthcare settings and patient populations. Nurses applied these SNLs to formulate nursing diagnoses, outcomes, and interventions, although their usage varied among participants, leading to inconsistencies and discrepancies in application and accuracy. These standardized nursing languages played a pivotal role in documenting patient care, enhancing the quality of care, and facilitating effective communication among healthcare professionals. However, the study also highlights the need for ongoing education and training initiatives aimed at promoting the consistent and accurate implementation of SNLs in nursing practice.

Furthermore, the study encompasses several key aspects of nursing practice and knowledge related to SNL. It sheds light on the sociodemographic characteristics of participants, revealing a predominantly female nursing workforce with varying levels of education. Although there is a relatively high level of awareness of SNL, primarily acquired through educational experiences and workshops, formal theoretical teaching about SNL appears to be lacking for a significant portion of nurses. Knowledge levels regarding SNL exhibit disparities, with only a small percentage of participants possessing a comprehensive understanding.

While many nurses report using SNL in their healthcare facilities, the regular implementation of the nursing process appears to be infrequent, and there is no clear correlation between knowledge levels and consistent SNL utilization. Despite the variations in SNL awareness, knowledge, and utilization, the majority of nurses perceive SNL positively, acknowledging its potential to enhance nursing practice, improve care quality, and foster professional pride. However, some participants find SNL cumbersome, and a significant portion doubts its feasibility, even with adequate staffing resources.

DISCUSSION

The findings from the various studies discussed in this synthesis point to the pivotal role of Standardized Nursing Language (SNL) in contemporary nursing practice. These studies provide valuable insights into the awareness, knowledge, utilization, and perceptions of SNL among healthcare professionals, nursing students, and across different healthcare settings and patient populations. Additionally, they shed light on the practical applications of SNL in clinical practice, highlighting its impact on healthcare documentation, nursing diagnoses, care planning, and overall patient care. In this discussion, we will delve into the implications of these findings, the challenges faced in implementing SNL, and the opportunities it presents for improving nursing practice and patient outcomes.

Enhancing Nursing Practice through Standardized Language

One of the central themes that emerge from these studies is the potential of SNL to enhance nursing practice. The majority of participants in these studies expressed a positive outlook on SNL, recognizing its role in improving the quality of care provided to patients. They acknowledged SNL as a valuable tool for precise documentation, care planning, and effective communication among healthcare professionals.

This aligns with the broader healthcare industry's shift toward standardization and evidence-based practice. By using standardized language, nurses can ensure consistency

in documenting patient information, leading to improved care coordination and better patient outcomes. In a previous study, participants noted that care plans had only a moderate level of added value but were frequently used incorrectly.

While they had a reasonable grasp of traditional standardized nursing languages, they found them challenging to employ (81%) and ineffective in accurately representing nursing care delivery and its outcomes (78%). Regardless of their educational backgrounds and years of experience, participants felt that these language systems lacked clarity ($P = .058$), ease of use ($P = .240$), and practical applicability ($P = .039$) in the context of actual nursing practice. Nurses emphasize the need for immediate changes, including the revision of language systems and the improvement of data, to have a positive impact on nursing care provision and the health outcomes of individuals receiving primary healthcare services (Rios Jimenez et al., 2020).

Acquiring accurate and comparable information from this system is of utmost importance for improving patient safety, the quality of healthcare, and evidence-based practices, as emphasized by Park and Lee's findings in 2015 (Park & Lee, 2015). Additionally, research conducted by Dai and their team in 2021 indicates that utilizing standardized nursing language based on NNN linkages when communicating with anxious patients in the emergency department (ED) could potentially alleviate their anxiety (Dai et al., 2021).

Awareness and Education Gaps

However, the studies revealed disparities in SNL awareness and knowledge among participants, with some, especially nursing students, showing high awareness while others lacked formal education on SNL. This education gap can hinder consistent and accurate SNL implementation in nursing practice, highlighting the need for standardized education and training programs for nursing professionals. In a prior study, three hospitals showed moderate SNL usage rates (49.1%, 50.8%, and 46.7%) with varying documentation quality between 2015 and 2019. Respondents viewed nursing process booklets positively but faced challenges like motivation, staffing shortages, and SNL comprehension.

The specialty area had the highest predictive value ($B = 0.790$) in association tests. Notably, significant differences existed in nursing documentation quality among the three hospitals, with mean values of 1.3 ± 0.5 , 1.6 ± 0.4 , and 1.5 ± 0.4 . In summary, utilization levels were moderate, and documentation quality fluctuated, necessitating standardized nursing language training to improve documentation in process booklets (Ojo & Olaogun, 2023). The study suggests that enhancing the use of SNLS can be achieved through increased seminars, the establishment of an SNL usage policy, and the adoption of electronic documentation (Enebeli, Akpan-Idiok, et al., 2022).

Challenges and Practical Considerations

Some participants in these studies raised concerns about the potential complexity and practical challenges associated with SNL's implementation. These challenges included issues related to cumbersome documentation processes and doubts about SNL's feasibility even with adequate staffing resources. These concerns warrant attention from healthcare institutions and educators. It is essential to address these challenges by providing support, resources, and training to nursing professionals to help them overcome barriers to SNL adoption (Ojo & Olaogun, 2022, 2023).

Implications for Nursing Research and Practice

The findings of these studies have several implications for nursing research and practice. Firstly, they highlight the need for ongoing research to explore the best practices for integrating SNL into nursing education and practice. Additionally, research can focus on developing user-friendly tools and technologies that streamline the documentation process, making it less burdensome for healthcare professionals. Secondly, nursing institutions and regulatory bodies should consider incorporating SNL education into nursing curricula and guidelines.

This can ensure that future generations of nurses are well-prepared to leverage SNL effectively in their practice. Moreover, healthcare organizations should invest in training and continuing education opportunities for their nursing staff, enabling them to keep pace with evolving SNL standards and practices. This investment can lead to improved patient care, reduced errors, and enhanced care coordination.

The limitation of this study was this systematic review wasn't registered with PROSPERO or other international databases.

CONCLUSION

In conclusion, the studies discussed in this synthesis underscore the significance of Standardized Nursing Language (SNL) in contemporary nursing practice. SNL has the potential to revolutionize nursing documentation, care planning, and communication. While there are challenges and disparities in awareness and knowledge, there is a clear consensus on its positive impact.

To fully harness the benefits of SNL, healthcare institutions, educators, and regulatory bodies must collaborate to provide comprehensive education, training, and support to nursing professionals. By doing so, the nursing profession can continue to evolve, adapt, and thrive in an increasingly standardized and evidence-based healthcare environment. Ultimately, this will result in better patient care and improved healthcare outcomes.

Looking ahead, there are promising opportunities for further research and development in this domain. Collaborative endeavors among healthcare institutions, educators, and regulatory bodies are imperative to designing and implementing comprehensive educational frameworks. Such frameworks should aim at empowering nursing professionals with the requisite knowledge, skillsets, and support mechanisms essential for effective SNL utilization. Additionally, future research endeavors could delve deeper into assessing the long-term impact of enhanced SNL integration on patient outcomes and healthcare delivery models.

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APPENDIX 1. Studies result in table

Table 2. Included study characteristics

Author, publication year	Study design, Country, Healthcare setting	Outcome
(Ojo et al., 2020)	Design: cross-sectional Country: Nigeria Healthcare setting: University	This study assessed awareness and perceptions of Standardized Nursing Language (SNL), NIC, NOC, and NANDA-I. Nursing students in Nigeria were well-informed about SNL. They perceived SNL as important for their education and practice and believed it should be integrated into their curriculum. Additionally, the study highlighted the significance of regulatory bodies and educational institutions in promoting SNL education in nursing programs.
(Olatubi et al., 2019)	Design: cross-sectional Country: Nigeria Healthcare setting: Hospital	Most of the participants (80.8%) had heard about SNL from school, seminars, or workshops, but only 60.0% knew the number of steps in the nursing process. Some nurses (39.2%) agreed that SNL cannot be practiced even with adequate staffing. SNL positively impacted nursing practice and care quality, but there were gaps in knowledge and regular use of SNL among the participants.
(Adubi et al., 2018)	Design: Retrospective record reviews Country: Nigeria Healthcare setting: University Hospital	1-5 years of experienced nurses total of 270 attended the Standardized Nursing Language Continuing Education Program (SNLCEP). These nurses were responsible for documenting in Nursing Process Books (NPBs) on various wards. There was a significant difference in the documentation of nursing care in different wards means the impact of SNLCEP was also different. The nurses had an improved quality of documentation of nursing care. The chi-square test result indicated there was no significant difference in documentation of nursing care among the wards.
(Brito-Brito et al., 2022)	Design: Observational, descriptive, cross-sectional, and epidemiological study Country: Spain Healthcare setting: Primary Care	Most of the participants were 65-79 years old (43.7%). About 77.7% of the participants were classified as independent (49%), frail (34.5%), and dependent (16.5%). Most participants (89.2%) were highly complex chronic patients. Common chronic health conditions included high blood pressure (87.2%), hyperlipidemia (80%), osteoarthritis (67.8%), and diabetes (56.1%). Significant associations were found between dysfunction in certain health patterns and age group, physical exercise habits, and chronic conditions like dementia. Several NIC interventions showed associations with older age groups, higher levels of dependency, and specific chronic health conditions like asthma and dementia.

Author, publication year	Study design, Country, Healthcare setting	Outcome
(Widodo et al., 2020)	Design: Descriptive study Country: Indonesia Healthcare setting: Hospital	The most frequently established nursing diagnosis in perioperative patients was anxiety (46.23%). According to the SDKI, most frequent diagnosis were 27.36% of cases. The most frequent outcome was level of infection (27.36%), determined with SLKI. But, all specified nursing interventions determined in the study were found not to be in accordance with the SIKI. Most of the intervention, implementation, and evaluation of nursing care were following the standards.
(Silva et al., 2022)	Design: Mixed-method study Country: Brazil Healthcare setting: Hospital	The primary surgical indication of patients was osteoarthritis (86%). Acute pain was the most prevalent nursing diagnosis (96%), followed by Risk for falls (62%). Fall prevention intervention (33.3%) was the most prescribed. There was a significant improvement in all nursing outcome scores from the first to fourth day of follow-up.
(Aleandri et al., 2022)	Design: Descriptive study design Country: Italy Healthcare setting: Community Health Centers	Nursing diagnoses were correctly identified in care plans based on nursing assessments with an accuracy rate of 83.7%. The study further analyzed the "needs" section using the NANDA-I taxonomy to link diagnoses to specific needs. There were incomplete nursing care plans in the software. Approximately 13.4% of the plans lacked either outcomes or interventions. These findings provide insights into the nursing process and areas where improvements in care planning and documentation may be needed.
(Shin et al., 2021)	Design: Retrospective descriptive study Country: Korea Healthcare setting: Nursing Home Residents	The study included 57 residents from 21 NHs. The most frequent nursing diagnosis in NHs was "risk for falls," (85.9%). The most frequently applied NOC outcomes were "vital signs" and the most frequently applied NIC interventions included "medication management." The study analyzed linkages between nursing diagnoses, outcomes, and interventions (NNN linkages).
(Somantri et al., 2021)	Design: cross-sectional research Country: Indonesia Healthcare setting: Hospital	Most nurses (56.06%) obtained knowledge about nursing diagnosis formulation from their teachers. Half of the respondents (50%) referred to textbooks for formulating nursing diagnoses and 48.49% did not use standardized nursing diagnoses. Nurses with undergraduate education had a higher rate of correct diagnoses (50%) compared to those with diploma education (21.4%). Nurse practitioners' level 1 had the highest percentage (50%) of correctly formulated nursing diagnoses compared to

Author, publication year	Study design, Country, Healthcare setting	Outcome
		other career levels.
(Enebeli, Akpan-Idiok, et al., 2022)	Design: cross-sectional research Country: Nigeria Healthcare setting: Tertiary health facility	The primary finding of the research indicates that although nurses acknowledge the benefits of employing SNLs, they face obstacles that impede their effective utilization. These challenges encompass a shortage of staff, time constraints, inadequate resources, and a lack of familiarity with NOC and NIC. As a result, the application of SNLs among nurses is suboptimal.
(Rios Jimenez et al., 2020)	Design: Multicenter, observational, cross-sectional Country: Spain Healthcare setting: Primary healthcare centers	This study revolved Primary Healthcare's words regarding the utilization and effectiveness of standardized nursing care plans and traditional nursing language systems. Nurses concerns about the frequent misuse of care plans and faced challenges applying traditional standardized nursing languages in practical situations. Despite possessing reasonable knowledge, they found these language systems inadequate for accurately representing nursing care and outcomes in individuals receiving Primary Healthcare services in Catalonia
(Adereti & Olaogun, 2019)	Design: Quasi-experimental Country: Nigeria Healthcare setting: Hospital	The study involved 32 nurses, divided into two wards. Regarding computer familiarity, 75% of electronic ward nurses and 62.5% of paper ward nurses reported being familiar with computers. The study evaluated nurses' documentation quality across various phases of the nursing process and found significant improvements after educational intervention in both wards.

Appendix 2. Critical Appraisal

JBI CRITICAL APPRAISAL CHECKLIST FOR ANALYTICAL CROSS-SECTIONAL STUDIES

No	Question	Olatubi et al. (2019)	Ojo et al. (2020)	Britto-Britto et al. (2022)	Widodo et al. (2020)	Aleandri et al. (2022)	Somantri et al. (2021)	Enebeli et al. (2022)	Jimenez et al. (2020)
1	Were the criteria for inclusion in the sample clearly defined?	Y	Y	Y	Y	Y	Y	Y	Y
2	Were the study subjects and the setting described in	Y	Y	Y	Y	Y	Y	Y	Y

No	Question	Olatubi et al. (2019)	Ojo et al. (2020)	Britto-Britto et al. (2022)	Widodo et al. (2020)	Aleandri et al. (2022)	Somantri et al. (2021)	Enebeli et al. (2022)	Jimenez et al. (2020)
	detail?								
3	Was the exposure measured in a valid and reliable way?	Y	Y	Y	Y	Y	Y	Y	Y
4	Were objective, standard criteria used for measurement of the condition?	Y	Y	Y	Y	Y	Y	Y	Y
5	Were confounding factors identified?	Y	N/A	Y	Y	U	N	Y	Y
6	Were strategies to deal with confounding factors stated?	Y	Y	Y	Y	Y	Y	Y	Y
7	Were the outcomes measured in a valid and reliable way?	Y	Y	Y	Y	Y	Y	Y	Y
8	Was appropriate statistical analysis used?	Y	Y	Y	Y	Y	Y	Y	Y

Note: Y = yes; N= no; U= unclear; N/A= not applicable

JBI CRITICAL APPRAISAL CHECKLIST FOR QUASI-EXPERIMENTAL STUDIES

No	Question	Adubi et al. (2018)	Silva et al. (2022)	Shin et al. (2021)	Adereti et al. (2019)
1	Is it clear in the study what is the 'cause' and what is the 'effect' (i.e. there is no confusion about which variable comes first)?	Y	Y	Y	Y
2	Were the participants included in any comparisons similar?	N/A	N/A	N/A	Y
3	Were the participants included in any comparisons receiving similar treatment/care, other than the exposure or intervention of	Y	Y	Y	Y

No	Question	Adubi et al. (2018)	Silva et al. (2022)	Shin et al. (2021)	Adereti et al. (2019)
	interest?				
4	Was there a control group?	N	N	N	Y
5	Were there multiple measurements of the outcome both pre and post the intervention/exposure?	Y	N	Y	Y
6	Was follow up complete and if not, were differences between groups in terms of their follow up adequately described and analyzed?	Y	Y	Y	Y
7	Were the outcomes of participants included in any comparisons measured in the same way?	Y	Y	Y	Y
8	Were outcomes measured in a reliable way?	Y	Y	Y	Y
9	Was appropriate statistical analysis used?	Y	Y	Y	Y

Note: Y = yes; N= no; U= unclear; N/A= not applicable