





Evidence Synthesis for the Development of National Nursing-Sensitive Indicators in Malaysia: A Literature Review and Stakeholder Engagement Approach

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Abstract

Introduction: Nursing-sensitive indicators measure and evaluate nursing care quality and its contribution to patient care. The identification of indicators that demonstrate nursing care contribution and the quality of care delivered locally is of paramount importance, and national indicators that demonstrate this are essential. This paper aims to provide an evidence base of nursing-sensitive indicators that can facilitate the conceptualization of local nursing national indicators.

Method: A multifaceted and iterative approach incorporating literature review, and stakeholder engagements was utilized in evidence synthesis. A review of indicators present internationally complemented by the inclusion of context-specific local NSIs through stakeholder engagements was performed. Secondary data analysis of documents from an environmental scan was also included to highlight areas of concern for nursing-sensitive indicator prioritization from the viewpoint of nurses.

Results: A total of 64 articles were reviewed and indicators were coded according to the Nursing Care Performance Framework subsystems, dimensions, and variables. All papers reviewed had documented outcome indicators. From our secondary data analysis, nurses identified areas of concern such as nursing staff supply, staff maintenance, nursing processes and risk outcomes, and safety to be prioritized for developing quality indicators.

Conclusion: This paper provides a list of NSIs coded systematically with definitions to aid stakeholders in prioritizing indicators for national indicator development. The inclusion of areas of concern provides insight into NSIs that nurse practitioners find relevant to the local context. To our knowledge, this is the first paper that includes evidence available in the literature and incorporates stakeholders' perspectives in synthesizing evidence needed to guide the development of national nursing indicators. This iterative approach is crucial because it enhances the likelihood of knowledge translation.

Keywords

nursing-sensitive indicators, stakeholder engagement, Malaysia

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Introduction

As nations endeavor to attain universal health coverage, it is vital to incorporate quality of care into healthcare services (World Health Organization, 2023). NSIs are the central quality measures used to quantify the quality of nursing care and nursing services' contribution to patients (Gathara et al., 2020). Monitoring NSIs not only identifies areas for enhancing care quality but also

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directs improvement efforts effectively (Afaneh et al., 2024). Recent systematic reviews highlight improvements in patient outcomes across various settings through focused attention on NSIs (Afaneh et al., 2024; Blume et al., 2021; Eglseer et al., 2021). The COVID-19 pandemic further underscored the critical importance of NSIs, revealing shifts in nursing resources and their impact on care quality metrics such as increased rates of nurse burnout and changes in patient outcomes (Reynolds et al., 2023; Ribeiro et al., 2022).

Despite extensive research on nursing care evaluation, the focus often remains fragmented, emphasizing specific indicators or criteria without a holistic approach (Driscoll et al., 2018; Dubois et al., 2013; Oner et al., 2021). Research indicates that hospitals with better organizational features—such as higher proportions of highly educated nurses, optimal nursing skill mixes, and lower nurse-patient ratios—yield improved nurse and patient outcomes. Additionally, the adoption of person-centered care correlates with reduced restraint use, shorter hospital stays, enhanced family involvement, and increased nurse confidence and competence (Casarez & Smith, 2024). Integrating these organizational strategies and person-centered care principles promises a comprehensive approach to evaluating and enhancing nursing care quality. In Malaysia, there has been a demand from healthcare institutions and nursing managers for an evidence base of NSIs. However, the dispersion and lack of cohesiveness in NSI information pose significant challenges for local stakeholders to systematically replicate or interpret data.

The health system's rapid growth demands policies and strategies with a strong emphasis on quality of care. The Quality Assurance Technical Committee in Malaysia, comprising key members from various healthcare disciplines, including nurses, is entrusted with monitoring the national quality assurance program through the national indicator approach (NIA). This approach serves as a monitoring and feedback system to identify quality issues (Awang et al., 2023; Mahmud et al., 2015). While the current nursing NIA, which focuses on the incidence of phlebitis among inpatients with intravenous cannulation, provides insight into the quality of care provided by the nurses, it does not fully capture the diverse responsibilities and multifaceted roles that nurses shoulder. Therefore, there is a growing need to develop an NIA that accurately reflects the contributions of nurses in all aspects of patient care.

Our research approach utilized a multipronged strategy incorporating conceptual frameworks and stakeholder engagements to synthesize evidence, a method effective in knowledge translation (Fun et al., 2019). Unlike most reviews of NSIs, which often overlook stakeholder involvement, we emphasize the importance of engaging implementers and policymakers to curate indicators that resonate with their needs. With the guidance of our stakeholders, we aim to present an initial list of NSIs and the areas of concern for NIA development for nurses in Malaysia in this review paper.

Methods

Due to the scarcity of NSI-related research or a comprehensive compendium in Malaysia, a literature review was adopted to enable a wide array of studies to be captured. The information on NSI that is available in international literature was aimed to be collated by understanding the context of each study to ensure its practical relevance in Malaysia. Additionally, due to practical limitations such as time and budget, a literature review is deemed to be the most feasible method to answer the objectives.

The methods included a review of international NSIs, supplemented by context-specific indicators relevant to the Malaysian healthcare system. Stakeholder engagements were frequently held to incorporate feedback to ensure the contextual relevance of NSIs and to identify key areas of concern for the development of relevant national-level quality indicators based on nurses' perspectives.

Literature Review

The following methods were used in the literature search: (i) electronic database search, (ii) search of Malaysian and international professional and government websites, (iii) literature search using Google and Google Scholar, and manual search of reference lists of relevant research publications. To ensure a manageable but meaningful body of literature for the study of relevant NSIs, publications had to focus exclusively on nurses, and they were also limited to conceptually rich documents (that reviewed and collated nursing quality indicators, developed frameworks, and provided information or descriptions of the indicators). The quality of the selected documents was not assessed, consistent with the authors' aim of collating and prioritizing a comprehensive list of indicators rather than evaluating their application or effectiveness.

Electronic Database Search. We conducted the search of electronic databases, including PubMed, CINAHL via EBSCOhost and Embase. Although the search was restricted to English-language publications and reviews, no limits were placed on the publication date. Our search strategy employed a combination of free-text terms, specifically focusing on “nurses,” “nursing-sensitive indicators,” “quality indicators,” and “review.” The full electronic search strategy employed in this study is available in Supplementary Files. The abstracts were screened by two researchers for relevance. Any disagreement was consolidated by involving a third researcher. Subsequently, a single researcher reviewed the full text of the remaining articles to determine if the article should be included or excluded. Decisions regarding the inclusion or exclusion of a reference adhered to the predetermined criteria, as described in detail in Table 1.

Professional and Governmental Websites. The research team also searched websites of international nursing associations,

Table 1. Inclusion and Exclusion Criteria.

Inclusion criteria		Further details	Exclusion criteria
Population	Nurses	Nurses, whether referred to as nursing staff or personnel, are trained in the scientific principles of nursing. They meet specific educational and clinical standards and provide essential care to patients of all ages and communities.	No reference to nurses and nursing care or mentions only nurses only as a subgroup.
Concept	Quality indicators	Quality-related measures or indicators reflecting the impact of nursing practices and interventions on patient outcomes.	Only mentions indicators without providing detailed information, such as definitions, applied frameworks, or the calculation of indicators.
Context	Nursing care across diverse healthcare settings	Nursing care is provided across various healthcare settings (i.e., hospitals, primary care clinics, home care, and nursing homes). It included medical and supportive services to individuals and communities needing assistance with daily activities or continuous health care.	None
Study design and document type	Reviews or conceptualization	Include reviews and theoretical papers (nonempirical research) on the development of nursing-sensitive indicators. They either review or develop models and frameworks or conceptualize nursing-sensitive indicators and the overall quality of nursing care. In instances where multiple versions of a document exist, only the most recent version is considered.	Studies that conducted primary data analyses on nursing-sensitive indicators without detailing the indicator development process or lacking information on the applied framework. Methodological articles (e.g., questionnaire development/validation, sampling/recruitment strategies, innovative analytical methods, dashboard creation, and feasibility studies). Sources such as newspaper articles, presentation materials, conference proceedings, social media posts, and unofficial websites
Date and language		Documents that were published in English and not restricted to any year. For Malay language documents, we are specifically interested in forms and other pertinent documents directly relevant to the scope of our review. Not restricted to any year	None

and national and international medical, research, and governmental organizations that monitor health and its related quality indicators. These searches were guided by a curated list of relevant organizations identified from the initial electronic database search (see section Electronic Database Search) For each website, we used the same search terms as those applied to the published articles. In cases where a website lacked a built-in search feature, we examined all its pages and associated web links. If these websites were not in English, translations were conducted based on available tools to extract information relevant to NSIs. The list of all websites searched is available in the Supplementary Files section.

Google and Google Scholar. A search of Google was undertaken using the search terms “nursing-sensitive indicator,”

“nursing quality indicator,” “clinical nursing measures,” “clinical nursing indicators” or “nursing performance indicator.” The first 100 results were reviewed for potential relevance.

Stakeholder Engagement

This study also complemented the data obtained with (i) nursing stakeholder engagement sessions and collection of hardcopy documents in the field and (ii) secondary analysis of data gathered from the document review through an environmental scan.

Stakeholder Input. This study involved a total of 57 nurses and nurse managers representing hospitals, primary care,

district, state, and national levels from all states in Malaysia (excluding the Federal Territory Labuan) to develop and establish an evidence base for NSIs. The stakeholders selected for this study ranged from nursing policymakers, and nursing managers, to frontline nurses with service experience of 5–30 years. Preliminary findings from the literature review were presented to nursing policymakers and managers to gain insight into how the evidence synthesized could be further refined to resonate with local nursing practice nuances. From these engagements, the suggestion to conduct an environmental scan workshop for nurse representatives from various disciplines such as maternal and child health, intensive care, and primary care settings was proposed. Staff nurses, and nursing managers together with representatives from the Nursing Division in Malaysia gathered and provided their feedback on relevant indicators in Malaysia.

Environmental Scan. An environmental scan was conducted during a two-day workshop. The activities implemented are described in Figure 1. Additional documents such as reports containing state-specific NSI were provided by nurses from their respective facilities during this workshop. Document templates containing information on the dimension, NSI, and the justification for the choices were provided to each group to document the areas of concern for NSI prioritization. These additional documents ensured that a compilation of local NSI could be collated and the iterative discussions that were held amongst various nurses ensured areas of concern that were selected were of practical relevance.

Data Abstraction and Analysis

A standardized data extraction template was developed to extract data from each relevant document. Content analysis was conducted to categorize the indicators according to a coding scheme developed by the researchers. We used the Nursing Care Performance Framework (NCPF) as the conceptual framework and the coding scheme was developed from this framework. This model not only builds on the thrust of Donabedian's Structure-Process-Outcome model but also provides an understanding of the operating mechanisms between these key components while demonstrating their interactions. The three nursing subsystems that are present within this framework are (1) acquiring, deploying, and maintaining nursing resources, (2) transforming nursing resources into nursing services, and (3) producing positive changes in a patient's condition because of providing nursing services. This coding scheme was adopted in this study for the systematic organization of NSIs to not only assess its impact on patient care but also to demonstrate the granular interactions that are present within the components of each of these subsystems (known as dimensions) that are needed to achieve a specialized function (Dubois et al., 2013). This dual-framework approach enabled the

grouping of indicators with similar definitions but different denominations under one variable within each dimension.

To identify areas of concern for NIA development, summative content analysis was performed on the documents obtained from the 2-day workshop. These documents contained feedback information from Malaysian nursing experts which led to the refinement and validation of NSIs. The engagement session which stimulated discussion among these nurses ensured the areas of concern identified were of contextual relevance. This adds rigor and validity to the data analysis as the summative context provides clear, measurable data that is interpreted meaningfully.

Results

Figure 2 presents the details of the study selection process. Overall, the database search retrieved 1602 potentially relevant records. The final number of studies included in this review was 64 documents. The main reasons for the exclusion of these papers included the focus being not on nurses alone, not reporting on nursing indicators and articles not being reviewed.

Study Characteristics

The articles reviewed covered a wide range of care settings, from acute and primary care to long-term care services. They examined diverse environments, including general nursing care, community health, primary care services, and more specialized care like inpatient critical care units, operating rooms in hospitals, and pediatric services. A detailed description of these documents is provided in Table 2.

Collation of Nursing-Sensitive Indicators

Table 3 presents a brief description of the gathered indicators, categorized by their respective subsystems, dimensions, and variables. A detailed summary of all indicators, including their definitions and calculation methods where applicable, is available upon request from the authors.

Acquiring, Deploying, and Maintaining Nursing Resources. A total of 54 studies reported indicators in this subsystem. Our analysis demonstrated that the indicators reviewed fit within the four dimensions: nursing staff supply, working conditions, nursing staff maintenance, and economic sustainability, and were classified further into 14 variables.

Nursing Staff Supply. The quantity or intensity of nursing resources refers to the availability and allocation of nursing staff in a healthcare facility which is essential for meeting the diverse needs of patients and the population and achieving optimal outcomes (Afaneh et al., 2021; Backhaus et al., 2014; Doran, 2011; Goh et al., 2020; Needleman et al., 2002; Oner et al., 2021; Pearson et al., 2006; Rapin et al., 2015;

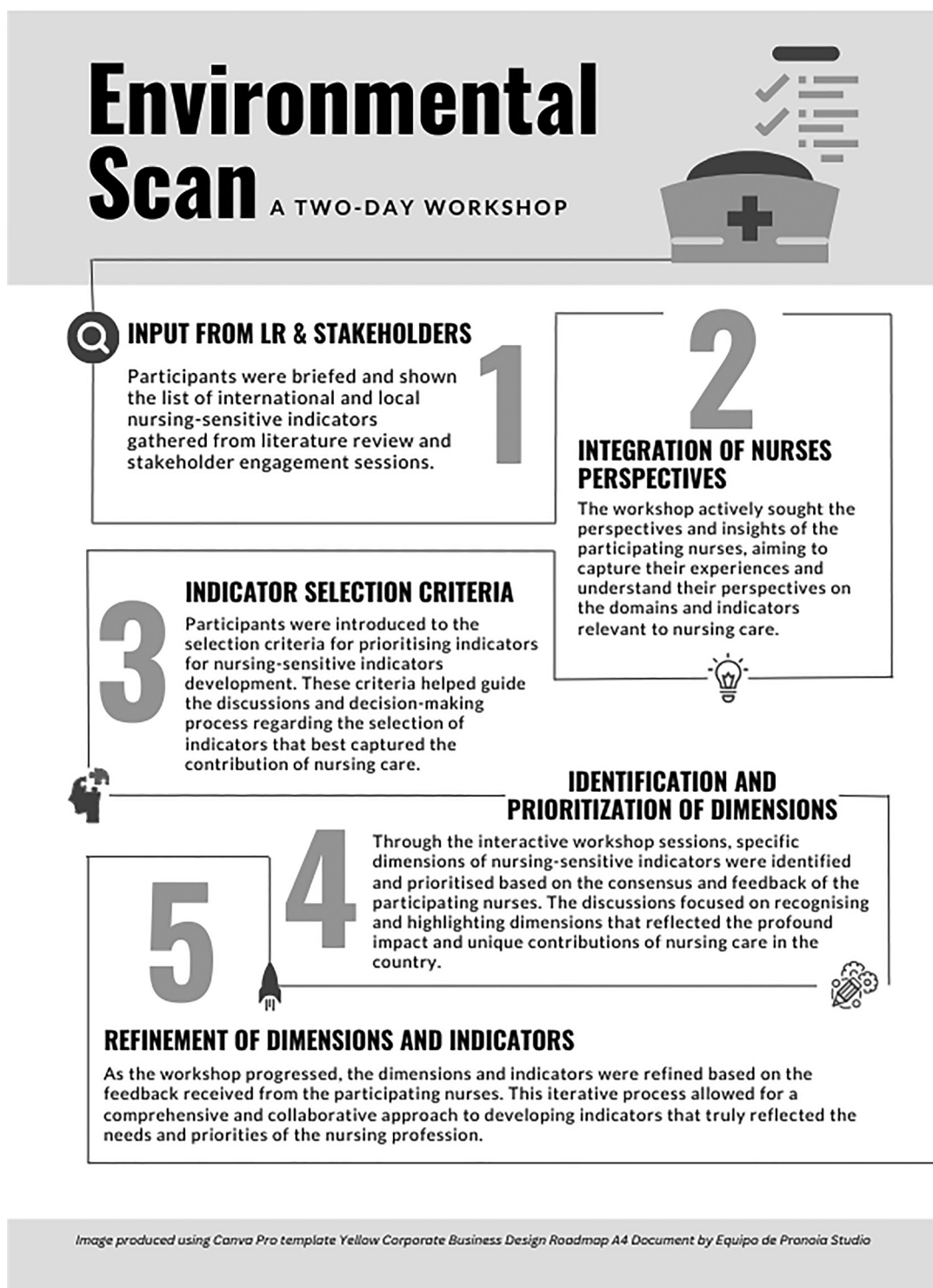


Figure 1. Environmental scan of the 2-day Workshop.

Recio-Saucedo et al., 2018). Many reviews highlighted the importance of having a skill mix in staffing levels and education in a care team (Backhaus et al., 2014; Burston et al., 2014; Clemens et al., 2021; Dubois et al., 2013; Gathara et al., 2020;

National Quality Forum, 2004; Savitz et al., 2005; Siaki et al., 2023). It has also been reported that experienced nurses are often more adept at managing unexpected challenges as the number of years of experience contributes to expertise and

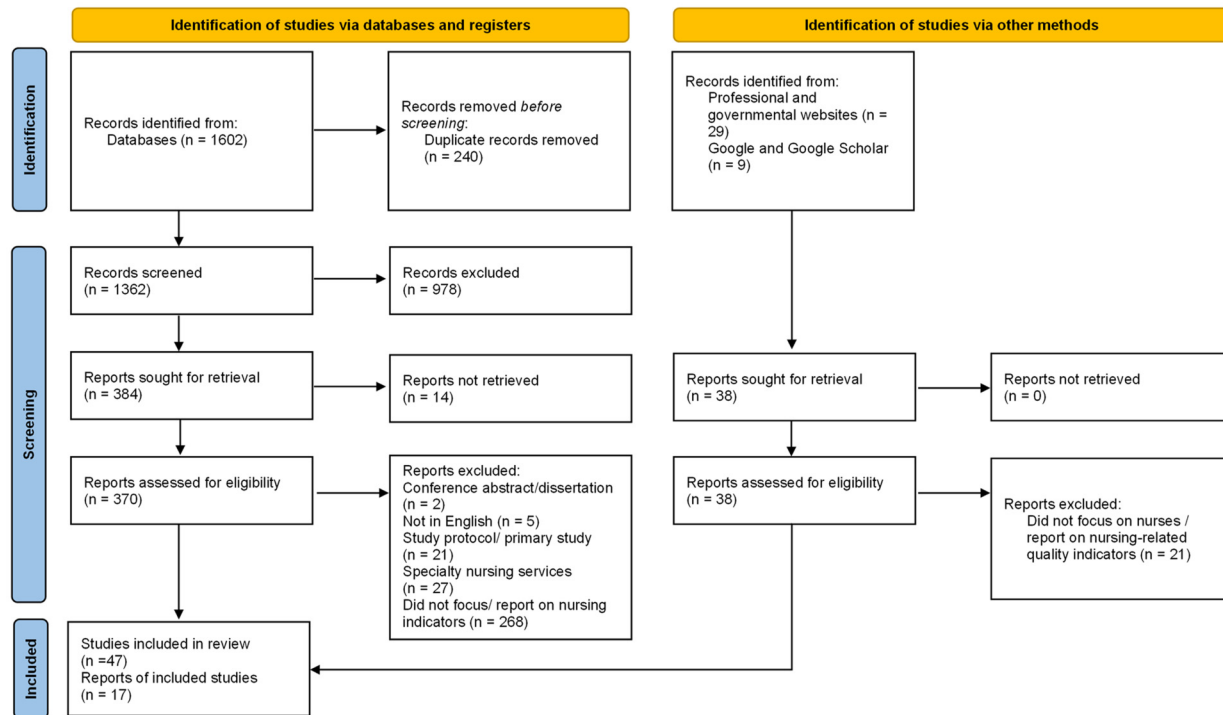


Figure 2. PRISMA diagram.

confidence (Burstun et al., 2014; Goh et al., 2020; Jones, 2016; Oner et al., 2021; Pearson et al., 2006; Siaki et al., 2023). Additionally, factors like patient and admission volatility reflect the patient volume, flow, and unit turbulence turnover which contributes to the overall understanding of patient acuity and resource allocation in healthcare settings (Jones, 2016; Oner et al., 2021; Patrician et al., 2011; Pearson et al., 2006).

Working Conditions. This dimension can be visualized from physical facilities, financial resources, availability of technology, and policies that act as precursors to ensure nursing staff can perform their roles (Adegoke et al., 2011; Fernández Fernández et al., 2022). to characteristics of employment that include a range of issues such as workload, contract staff, and nurse manager leadership (Doody et al., 2019; Doran, 2011; Egry et al., 2021; Jones, 2016; Metusela et al., 2022).

Staff Maintenance. The maintenance and support of nursing staff are crucial for the continuity of quality care. Indicators that consider the overall health of nursing professionals, burnout levels, and medication use provide information on the health and quality of life at work (Currie et al., 2005; Goh et al., 2020; Morioka et al., 2022; Oner et al., 2021; Pearson et al., 2006; Rapin et al., 2015; Siaki et al., 2023). Multiple reviews highlighted indicators that captured nurses' satisfaction with working conditions, communication, and clinical outcomes (Currie et al., 2005; Dubois et al., 2013; Gathara et al., 2020; Middleton et al., 2007; Pearson et al.,

2006; Rapin et al., 2015; Rouleau et al., 2017; Whitehead et al., 2019).

Economic Sustainability. Indicators in this dimension cover aspects such as costs, resource expenses, and indicators that measure hospital admissions and insurance program spending (Adegoke et al., 2011; Backhaus et al., 2014; Castelli et al., 2020; Dubois et al., 2013; Gathara et al., 2020).

Transforming Nursing Resources Into Nursing Services (Process). This subsystem broadly describes the processes that not only encompass the duties performed by nurses in guiding and empowering patients and their families but also the supportive nature of nursing managers to produce an environment that is conducive for nurses. We coded the indicators gathered from 35 articles into two dimensions and eight variables under this subsystem.

Nursing Processes. The variable assessment, planning, and evaluation cover various indicators that document nursing processes such as timely identification of needs and health summary documentation. Despite these indicators forming the basis of care, the quality of the information that is documented in these assessments provides crucial information for other healthcare professionals to deliver quality care to patients (Australian Commission on Safety and Quality in Health Care, 2012; Devane et al., 2019; Gathara et al., 2020; Jones, 2016; Koenders et al., 2019; Metusela et al., 2022).

Indicators that were captured internationally and locally in the problems and symptom management variable include the adherence to care pathways such as infection control guidelines,

Table 2. Study Characteristics.

No	Document (authors, year)	Objective(s)	Study method (review type)	Setting	Primary studies' study location	Total articles included
1	Adegoke (2011)	To provide a review of the literature on the approaches and conceptual frameworks for evaluating progress with skilled birth attendance.	Literature review	Midwifery services, maternity units	Ghana, Indonesia, Tanzania, Sri Lanka, Benin, Ecuador, Jamaica, Rwanda, Nepal, Burkina Faso, and Kenya	27
2	Afaneh (2021)	To analyze and develop an in-depth understanding of the concept of nursing-sensitive indicators.	Literature review	Not specified	North America, Middle East and Asia, Europe	36
3	Backhaus (2014)	To summarise the findings from recent longitudinal studies.	Systematic review	Nursing home	United States and Italy	20
4	Barnsley (2005)	(1) To identify performance indicators that focus on organisational structures and clinical processes of care, (2) To review evidence linking indicators to patient outcomes, (3) To have providers select indicators, and (4) To obtain providers' views on challenges in developing a performance assessment system.	Literature review	Family practices	Ontario (Canada)	Not specified
5	Battaglia (2016)	To describe the current health care environment, the role nurses are required to play, and whether any measures existed for current use in a benchmarking format for ambulatory care nurses.	Literature review	Ambulatory care	Not specified	Not specified
6	Burston (2014)	(1) Provide an overview of the key studies examining NSI, (2) discuss issues related to the studies of nursing-sensitive indicators, and (3) discuss considerations regarding the selection, reporting, and sustainment of these indicators.	Literature review	Acute care settings and specialist units (i.e., neonatal care, intensive care unit, chronic haemodialysis)	United States, Canada, Europe, Korea, Taiwan, Kuwait, Thailand, and Australia	40
7	Casteli (2020)	To systematically summarise the indicators of home-based hospitalization and the factors associated with the successful implementation and use of this model.	Review of review	Home-based services (home-based hospitalization)	Belgium, Spain, United Kingdom, Canada, Australia, Norway, and Denmark	15

(continued)

Table 2. Continued.

No	Document (authors, year)	Objective(s)	Study method (review type)	Setting	Primary studies' study location	Total articles included
8	Chang (1997)	To identify all published instruments that had been used to evaluate patient satisfaction in healthcare in the hospital setting.	Literature review	Hospitals (adult medical surgical wards)	Not specified	13
9	Chin (2011)	To review the literature regarding the quality of care of nurse-led and allied health personnel-led primary care clinics.	Literature review	Primary care	United Kingdom, Australia, Canada, and the United States	54
10	Clemens (2021)	To identify the influence of nursing and personal care staffing levels and/or skill mix on long-term care residents as measured by quality-of-care indicators.	Systematic review	Long-term care	Canada, the United States, Switzerland, Norway, Italy, Belgium and the Netherlands	34
11	Currie (2005)	To explore the relationship between quality of care and selected organizational variables.	Literature review	Not specified	United Kingdom and United States	Not specified
12	Devane (2019)	(1) To identify quality care process metrics and associated indicators in midwifery, children's, community or public health, acute, older people, mental health, and intellectual disability, and (2) To inform the development of a suite of process-sensitive metrics and their associated indicators.	Literature review	Midwifery services	Ireland	49
13	Dubois (2013)	(1) To develop a theoretically based framework to conceptualise nursing care performance, (2) To analyse how the different components of the framework have been operationalized in the literature, and (3) To develop a pool of indicators sensitive to various aspects of nursing care that can be used as a basis for designing a performance measurement system.	Systematic review	Acute care, long-term care, primary care	Not specified	101
14	Durrant (2017)	To discover the effect of nurse-driven protocols on the clinical predictors and	Systematic review	Various settings from general units (e.g., medical/ surgical units)	United States	29

(continued)

Table 2. Continued.

No	Document (authors, year)	Objective(s)	Study method (review type)	Setting	Primary studies' study location	Total articles included
15	Egry (2021)	prevalence of catheter-associated urinary tract infections. To map the indicators of good nursing practices in primary healthcare.	Scoping review	Primary care	United States	13
16	Fernandez (2021)	To identify preoperative indicators and/or predictors of complications or inefficiencies in the surgical process that can be modified within nursing practice.	Scoping review	Surgical unit	United States, Germany, Australia, Brazil, Canada, United Kingdom, Sweden, Austria, China, Denmark, Spain, Ethiopia, Finland, France, Iran, Iceland, Japan, and Norway.	15
17	Gathara (2020)	To identify nursing-sensitive indicators reported in the literature.	Scoping Review	Hospitals	US, Europe, Asia, Australia	23
18	Goh (2020)	To develop a hospital-based nursing healthcare model, including indicators and their relative importance.	Not specified	Hospitals	Taiwan	52
19	Hall (2003)	To review the literature on nursing report cards, balanced scorecards in nursing, and the concepts delineated in the four quadrants of the balanced scorecard.	Literature review	Not specified	Not specified	Not specified
20	Kalánková (2020)	To collate evidence about patient outcomes resulting from the phenomenon of incomplete nursing care described in the literature variously as missed, rationed, or unfinished nursing care.	Scoping review	Nursing homes, acute care settings, long-term health care facilities	United States and Europe	44
21	Koenders (2019)	To develop the first draft of a long list of quality indicators for physical activity of hospitalized adults of all ages.	Literature review	Hospitals	Not specified	53
22	Lampersberger (2022)	To describe the current state of the art regarding the prevalence and incidence of common nursing-sensitive indicators.	Narrative review	Home-based services	Europe, Australia, China, Canada, and Brazil	27
23	Middleton (2007)	To identify process and outcome measures previously used to evaluate	Literature review	Not specified	Australia (New South Wales)	64

(continued)

Table 2. Continued.

No	Document (authors, year)	Objective(s)	Study method (review type)	Setting	Primary studies' study location	Total articles included
24	Manfio (2016)	services provided by nurse practitioners, (2) To determine the relevance of these process and outcome measures in Australia (New South Wales). (1) To analyse the relationship between the quality indicators and the workload in nursing in the national and international literature, (2) To characterise the national and international scientific literature on the relationship between quality indicators and the workload in nursing, (3) To identify the methodological references used to investigate the relationship between the quality indicators and the nursing workload found in the national and international literature, and (4) To know what are the most used quality indicators and the relationship between them and the workload in nursing.	Integrative review	Not specified	Not specified	21
25	Morioka (2022)	(1) To identify the variables related to nurse staffing and outcomes and (2) To summarise the association between nurse staffing and nursing outcomes.	Scoping review	Hospitals (acute care)	Japan	15
26	Murphy (2019)	To develop a suite of nursing quality care process metrics and indicators for older person's care settings in Ireland.	Scoping review	Older persons care	Not specified	69
27	Mushta (2018)	To clarify failure to rescue as a nursing-sensitive indicator.	Not specified	Hospitals	Not specified	21
28	Myers (2018)	To identify suitable indicators for measuring the impact of nurse staffing and nurse skill mix variations on patient	Systematic review	Not specified	United States, United Kingdom, Asian countries (Korea and Thailand), Canada, Australia, South America, and Africa	44

(continued)

Table 2. Continued.

No	Document (authors, year)	Objective(s)	Study method (review type)	Setting	Primary studies' study location	Total articles included
29	Oner (2021)	outcomes in stand-alone high acuity areas. To provide a systematic review of the literature on nursing-sensitive indicators.	Systematic review	Hospitals (acute care)	United States, United Kingdom, Belgium, Canada, Taiwan, and South Korea	39
30	Osińska (2022)	To identify health-related quality indicators for residential long-term care that are currently publicly reported internationally.	Systematic review	Long-term care (residential-based)	United States, Canada, New Zealand, Australia, Belgium, Netherlands, Norway, and Sweden	21
31	Pearson (2006)	To identify the best available evidence on the appropriateness and effectiveness of nursing workload and staffing characteristics.	Systematic review	Hospitals	Not specified	40
32	Rapin (2015)	(1) To identify indicators potentially sensitive to nursing that can be used to evaluate the performance of nursing care in outpatient settings and (2) To integrate these indicators into the theoretical framework.	Scoping review	Ambulatory care	Not specified	22
33	Recio-Saucedo (2018)	To conduct a systematic review of the impact of missed nursing care on outcomes in adults in acute hospital wards and nursing homes.	Systematic review	Various settings including acute hospitals, nursing homes	Switzerland, Belgium, Finland, Germany, Greece, Ireland, Poland, Spain, Cyprus, England, United States, and Italy	14
34	Ridley (2008)	To integrate empirical findings regarding the relationship between nursing education level and patient safety to determine applicable patient outcome measures.	Integrative review	Hospitals	United States, New Zealand, Canada, and Thailand	24
35	Rodriguez (2015)	To construct conceptual definitions for indicators of the nursing outcome classification for infection severity, related to respiratory problems, based on scientific evidence on signs and symptoms of infection in adults.	Integrative review	Not specified	Brazil, United States, Canada, Spain, and Portugal	9
36	Rouleau (2017)	To conduct an overview of systematic reviews to	Review of review	Various settings (e.g., hospital, long-term care,	Not specified	22

(continued)

Table 2. Continued.

No	Document (authors, year)	Objective(s)	Study method (review type)	Setting	Primary studies' study location	Total articles included
		systematically summarise the evidence that comes from qualitative, quantitative, and mixed-method systematic reviews regarding the effects of information and communication technology on nursing care.		primary care, provider organizations, academic health centers)		
37	Savitz (2005)	To compare and contrast available quality indicator tools associated with nurse staffing outcomes.	Systematic review	Acute care settings	Not specified	24
38	Siaki (2022)	To identify evidence regarding ambulatory care nurse-sensitive indicators identification, development, implementation, and benchmarking.	Scoping review	Outpatient settings	United States, United Kingdom, Germany, Canada, China, and Portugal	12
39	Smeulders (2015)	To identify evidence-based quality indicators for safe in-hospital medication preparation and administration.	Systematic review	Not specified	Canada	5
40	Tropea (2011)	To develop a set of clinical indicators to minimize the risk and adverse outcomes of functional decline in older hospitalized people.	Literature review	Hospitals	Australia and United States	Not specified
41	Ueda (2017)	To develop quality indicators for low-risk labor care provided for mothers and infants primarily by midwives.	Literature review	In-hospital (midwifery)	United States, Australia, Canada, Japan, United Kingdom, Scotland, and New Zealand	32
42	Vituri (2015)	To identify the available evidence in the literature on Total Quality Management in nursing administration.	Integrative review	Hospitals	Brazil	24
43	Wagg (2018)	To create a set of key performance indicators to measure outcomes for toileting and containment.	Scoping review	Residential long-term care settings, community settings, services provided by a health care professional in a person's home	Not specified	89
44	Whitehead (2019)	To synthesize the evidence on the relationship between specialty nurse certification and patient,	Systematic review	Hospitals	United States and Australia	41

(continued)

Table 2. Continued.

No	Document (authors, year)	Objective(s)	Study method (review type)	Setting	Primary studies' study location	Total articles included
45	Wilson (2011)	nurse, and organisational outcomes. To identify the association between nurse staffing and clinical outcomes in hospitalized children.	Systematic review	Hospitals with pediatric care settings	Australia	8
46	Wilson (2012)	To identify indicators of quality nursing care by identifying structures, processes, and outcomes indicators perceived as valid, feasible, reliable, and suitable for Australian paediatric hospitals by nursing experts.	Literature review	Hospitals with pediatric care settings	United States, United Kingdom, and Australia	Not specified
47	Wu (2017)	To establish scientific, objective, and comprehensive nursing-sensitive quality indicators for the operating room to evaluate and monitor operating room nursing care quality.	Literature review	Hospitals (operating rooms)	Not specified	29
48	Agency for Healthcare Research and Quality (2022)	To provide a technical overview of relevant quality indicators.	Not specified	Not specified	United States	Not specified
49	Australian Institute of Health and Welfare (2009)	To recommend indicators for national reporting on safety and quality.	Not specified	Primary care and community health services	Australia	Not specified
50	Australian Commission on Safety and Quality in Health Care (2012)	(1) To provide the context for improving safety and quality in primary health care, and identify practice-level indicators currently in use, (2) To develop a candidate set of practice-level indicators of safety and quality for primary health care, in consultation with relevant individuals and organisations, (3) To obtain endorsement for the national set of practice-level indicators of safety and quality for primary health care and (4) To develop a specification for the national set of practice-level indicators of safety and quality.	Literature review	Primary care and community health services	Australia	Not specified

(continued)

Table 2. Continued.

No	Document (authors, year)	Objective(s)	Study method (review type)	Setting	Primary studies' study location	Total articles included
51	Canadian Institute for Health Information (2023)	Not specified	Not specified	Not specified	Canada	Not specified
52	Davies (2009)	(1) To produce a framework for developing quality indicators for Bristol Community Health Services and (2) To develop a set of indicators using the proposed framework.	Not specified	Community services	England (Bristol)	Not specified
53	Doran (2011)	To present a synthesis of the previous review and update based on new empirical evidence on nursing-sensitive indicators.	Literature review	Not specified	Not specified	Not specified
54	Farquhar (2008)	Not specified	Not specified	Not specified	United States	Not specified
55	Jones (2016)	To examine the imperatives, ideal conditions, history, and challenges related to effective outcome measurement in nursing.	Not specified	Not specified	Not specified	Not specified
56	Mccance (2012)	To gain consensus on key performance indicators that are appropriate and relevant for nursing and midwifery practice in the current policy context.	Not specified	Not specified	United Kingdom	Not specified
57	Metusela (2022)	To develop a suite of evidence-based indicators and measure high quality based on routinely collected data in Australian general practice.	Not specified	General practice services	Australia	Not specified
58	National Quality Forum (2004)	Not specified	Not specified	Hospitals	United States	Not specified
59	Needleman (2002)	To examine the relation between the levels of staffing by nurses in hospitals and the rates of adverse outcomes among patients.	Not specified	Hospitals	United States	Not specified
60	Patrician (2011)	To describe the creation, evolution, and implementation of a database of nursing-sensitive and potentially nursing-sensitive indicators	Not specified	Hospital (military hospitals)	United States	Not specified

(continued)

Table 2. Continued.

No	Document (authors, year)	Objective(s)	Study method (review type)	Setting	Primary studies' study location	Total articles included
61	Pressganey (2023)	(Military Nursing Outcomes Database). Not specified	Not specified	Ambulatory care	United States	Not specified
62	Start (2016)	To identify, define, and propose nurse-sensitive measures that reflect the work and value of registered nurses in ambulatory care settings.	Not specified	Not specified	United States	Not specified
63	The Shelford Group (2013)	To develop an evidence-based tool that enables nurses to assess patient acuity and dependency, incorporating a staffing multiplier to ensure that nursing establishments reflect patient needs in acuity/dependency terms.	Not specified	Not specified	United Kingdom	Not specified
64	Malaysian Patient Safety Goals 2.0 (2021)	To describe the Malaysian Patient Safety Goals & Key performance indicators (KPIs). It also has the technical specification of the associated KPIs.	Not specified	Not specified	Malaysia	Not specified

Note. Documents numbered 1 through 47 are reviews sourced from electronic databases. Documents 48 to 64 were gathered from professional and organizational websites and searches on Google and Google Scholar

pain, and medication management (Devane et al., 2019; Doody et al., 2019; Gathara et al., 2020; McCance et al., 2012; Ministry of Health Malaysia, 2021; Oner et al., 2021). The many hats that nurses wear in medication management are clear through the many reviews that capture the nurse's role in this area (Afaneh et al., 2021; Australian Institute of Health and Welfare et al., 2009; Barnsley et al., 2005; Chin et al., 2011; Devane et al., 2019; Gathara et al., 2020; Murphy et al., 2019; Siaki et al., 2023; Smeulers et al., 2015).

Additionally, nurses are advocates for health promotion activities and have shown to be actively involved in offering counseling sessions on areas like birth control, smoking cessation, and alcohol-related issues (Barnsley et al., 2005; Gathara et al., 2020; Jones, 2016; National Quality Forum, 2004; Ueda et al., 2017).

The indicators that lie within the scope of practice variable include services that nurses provide for noncommunicable diseases, mental health conditions, surgical care, and maternal and child health services. (Australian Institute of Health and Welfare et al., 2009; Barnsley et al., 2005; Gathara et al., 2020; Metusela et al., 2022).

Indicators under the hospital and community integration variable highlighted the role nurses play as care coordinators between facilities (Australian Institute of Health and Welfare et al., 2009; Dubois et al., 2013; Gathara et al., 2020; Rapin et al., 2015; Siaki et al., 2023).

Patient Centrality. Variables that lie within the dimension of patient centrality such as collaboration and communication, continuity and coordination, and patient-family involvement contain indicators that can act as precursors to identify issues that can hinder the provision of optimal services by nurses (Middleton et al., 2007; Siaki et al., 2023). Additionally, patients' awareness of who cares for them and who oversees the ward or team is crucial in ensuring patient centrality in nursing care delivery (Doody et al., 2019; McCance et al., 2012).

Producing Changes in Patient's Conditions (Outcome). This subsystem has indicators that were reported in all 64 of the documents reviewed, suggesting that the driving force of change in the three subsystems is more likely to be in the form of

outcome indicators. Six dimensions with the largest number of variables were categorized in this subsystem.

Risk Outcomes and Safety. Variables that capture indicators here include surgical-related complications, healthcare-associated infections, medication errors, and complications arising from the urinary tract or cardiopulmonary organs. Currently, in Malaysia, indicators that fall under vascular access-related complications and infection are being monitored at a national level (Ministry of Health Malaysia, 2021). Similar NSIs that were captured locally and internationally included patient falls, pressure ulcers, and transfusion reactions (Australian Institute of Health and Welfare et al., 2009; Farquhar, 2008; Gathara et al., 2020; Metusela et al., 2022; Ministry of Health Malaysia, 2021).

Patient Comfort & Quality of Life Related to Care. Efficient control of symptoms such as pain, appropriate use of restraints to balance patient safety and comfort, and incontinence monitoring are crucial aspects of healthcare delivery related to nursing care (Burston et al., 2014; National Quality Forum, 2004; Wagg et al., 2018).

Patient Functional Status. This dimension captures the ability of individuals to perform daily physical and cognitive activities, their nutritional status, and patients' progress in regaining their preillness or preinjury level of health (Burston et al., 2014; Casteli et al., 2020; Doran, 2011; Dubois et al., 2013; Kalánková et al., 2020).

Patient Empowerment. This dimension covers variables that contain NSIs which assess patients' ability to achieve appropriate self-care and provide insights into their level of independence and control over their health (Gathara et al., 2020; Hall et al., 2003; Middleton et al., 2007). Additionally, nurses are known to play a pivotal role in empowering patients to adopt health-promoting behaviors (Doran, 2011; Dubois et al., 2013; Metusela et al., 2022).

Patient Satisfaction. By considering patient input, nurses can incorporate their perspectives into care delivery, promoting person-centered care. (Afaneh et al., 2021; Australian Commission on Safety and Quality in Health Care, 2012; Australian Institute of Health and Welfare et al., 2009; Jones, 2016)

Joint Contribution of Nursing and Other Systems. The joint contribution of nursing and other systems serves as an outcome indicator, highlighting the combined efforts of healthcare professionals in delivering high-quality health services to patients from the aspects of healthcare utilization and length of stay in the hospital (Agency for Healthcare Research and Quality, 2022; Doran, 2011; Jones, 2016). NSIs such as early identification of deteriorating patients, prompt escalation of care, and effective communication, are crucial in preventing failure to rescue incidences (Burston et al., 2014; Gathara et al., 2020). By closely tracking mortality rates associated with conditions like sepsis,

pneumonia, acute myocardial infarction, and others, nurses can gain valuable insights into the effectiveness of their interventions and identify areas for improvement (Australian Institute of Health and Welfare et al., 2009; Farquhar, 2008; Myers et al., 2018).

Environmental Scan and Identification of Areas of Concern

Through stakeholder engagements, documents provided by nurse managers at local healthcare facilities uncovered many indicators that were predominantly structural indicators such as nursing care hours, nurse-to-patient ratio, and bed occupancy rates with process indicators covering a range of maternal and child health service indicators. Emphasis was also given to the education and professional development of nurses here locally as multiple NSIs were seen to capture this in documents provided by stakeholders.

For prioritization of areas of concern, nurses identified dimensions such as nursing staff supply, staff maintenance, nursing processes, and risk outcomes and safety as areas of concern. NSIs that need to be monitored locally by reviewing the indicators present from these areas of concern were selected by nurses upon continual dialogue sessions. The compilation of identified NSIs is visualized in the word cloud (Figure 3).

Discussion

This study used literature review and stakeholder engagement sessions to outline NSIs within a structured framework. Our findings suggest the multifaceted nature of nursing roles and the complexity of evaluating nursing care quality, emphasizing the need for a balanced skill mix, experience, and patient-centric approaches. This iterative effort provides the foundation for further dialogue and the development of national nursing indicators in the Malaysian healthcare system.

Numerous studies have examined NSIs but discrepancies in terminology and methodological differences contribute to research discordance in identifying quality indicators. These indicators, when reported in aggregate form or with overlapping definitions by different nursing studies, pose significant challenges to nurse managers who wish to select NSIs appropriate for the local ecosystem (Burston et al., 2014). An example of such inconsistency is the reporting of mortality indicators, where some studies apply a defined time frame while others provide a broad definition (Battaglia et al., 2016; Clemens et al., 2021; Middleton et al., 2007; Needleman et al., 2002; Wagg et al., 2018). This inconsistency makes it difficult to effectively compare and interpret the quality of care across healthcare settings and demographic groups in different countries. To address this challenge, this study improved the clarity for stakeholders by categorizing indicators with multiple interpretations into

Table 3. List of NSIs Coded into the Dimensions and Variables.

Subsystems	Dimensions	Variables and indicators (Variables in bold, Indicators in bullet form)
Acquiring, deploying, and maintaining nursing resources (structure)	Nursing staff supply	<p>Quantity/intensity of nursing resources</p> <ul style="list-style-type: none"> • Number of nursing staff/ staff levels • Distribution of staff categories • Full-time equivalent per bed/ patient • Nurse-to-patient ratio • Nursing care hours • Vacancy rate or understaffing <p>Patient classification system/ profiles</p> <ul style="list-style-type: none"> • Patient sociodemographic • Patient acuity levels • Patient turnover <p>Skill mix or composition of the care team</p> <ul style="list-style-type: none"> • Nursing skill mix <p>Support resources</p> <ul style="list-style-type: none"> • Physical, material and technological resources • Regulatory, governance and clinical policies • Systems integration • Information availability and communication • Patient safety policies • Health and quality of life at work • Work-related accidents, injuries, illnesses • Satisfaction at work/ with working conditions • Cost of resources
		<p>Nurse staffing qualifications</p> <ul style="list-style-type: none"> • Nursing education • Nursing experience • Continuing education • Professional development • Competency and skills • Nursing attitude <p>Employment conditions</p> <ul style="list-style-type: none"> • Nursing work environment • Workload • Continuity of staff <p>Nurses' retention</p> <ul style="list-style-type: none"> • Nurses' retention • Nurse turnover • Absenteeism <p>Cost/ visit, hosp. admissions and readmissions</p> <ul style="list-style-type: none"> • Cost/ visit, hosp. admissions and readmissions
	Working conditions/ physical work environment	<ul style="list-style-type: none"> • Practice quality improvement policies • Environmental safety for patients
	Nursing staff maintenance	<ul style="list-style-type: none"> • Cost/ visit, hosp. admissions and readmissions

(continued)

Table 3. Continued.

Subsystems	Dimensions	Variables and indicators (Variables in bold, Indicators in bullet form)
Transforming nursing resources into nursing services (process)	Nursing processes	<p>Assessment, planning, and evaluation</p> <ul style="list-style-type: none"> • Timely initial needs identification • Use of standardized needs assessments • Care plan availability and timely review • Health summary • Drug reactions and medication allergies • Risk factors assessed and recorded (e.g., childhood adverse events, body mass index, blood pressure, risk behavior) • Other assessments (nutritional status, cognitive and psychological conditions, specific population e.g., geriatric, women and children) • Skin integrity and pressure ulcer risk • Mobility assessment and fall risk evaluation • Continence assessment, promotion and management • Risk of venous thromboembolism • Protection, behavioral and psychosocial needs <p>Scope of practice</p> <ul style="list-style-type: none"> • Diabetes-related care • Hypertension and cardiovascular disease-related care • Respiratory disease (e.g., asthma) • Management of mental health conditions • Surgical care • Womb to tomb services (across life course) <p>Problems and symptom management</p> <ul style="list-style-type: none"> • Vital signs and pain monitoring and assessment • Care pathways, protocols, guidelines adherence • Physical and chemical restraints • Fall prevention measures • Pressure ulcer prevention and management • Wound management • Pain management • Use and monitor invasive medical devices use • Other care processes • Medication management <p>Promotion and prevention</p> <ul style="list-style-type: none"> • Screening for NCDs • Depression • NCD risks (e.g., body mass index) • Cancer (i.e., breast cancer, cervical cancer, colorectal cancer) • Education and counselling activities • Childhood immunization and adult vaccination <p>Hospital-community integration</p> <ul style="list-style-type: none"> • Discharge care plan/ instructions • Transmission of discharge summaries

(continued)

Table 3. Continued.

Subsystems	Dimensions	Variables and indicators (Variables in bold, Indicators in bullet form)
Producing changes in patients' conditions (outcome)	Patient centrality	<p>Collaboration, communication</p> <ul style="list-style-type: none"> • Involvement of other healthcare professionals in patient care <p>Patient/family involvement</p> <p>Surgical/ procedure-related complications</p> <ul style="list-style-type: none"> • Accidental puncture or laceration • Anesthesia associated complications • Electrical burns during surgery • Postoperative hemorrhage/hematoma • Wound dehiscence • Foreign bodies being left in the body • Unplanned return to operating theatre <p>Healthcare-associated infections</p> <ul style="list-style-type: none"> • Sepsis/ bloodstream infections • Surgical-site infection • Multidrug-resistant organisms infections <p>Medication errors and adverse drug events</p> <ul style="list-style-type: none"> • Inappropriate co-prescribing of medicines • Medication incident types, harm, or death • Medication administration error • Adverse drug events
	Risk outcomes and safety	<p>Continuity, coordination</p> <ul style="list-style-type: none"> • Consistent assignment of nurses • Recalls and reminders to patients • Patients aware/ know the care team/nurses • Management of pending diagnostic test results <p>Urinary complications</p> <ul style="list-style-type: none"> • Urinary tract infection • Catheter-associated urinary tract infections • Monitoring of urinary catheter utilization <p>Cardiopulmonary complications</p> <ul style="list-style-type: none"> • Cardiac arrest and shock • Postoperative or postprocedure cardiopulmonary complications • Ventilator-associated pneumonia • Nonventilator associated pneumonia • Aspiration pneumonia • Unplanned extubation and reintubation • Other pulmonary complications <p>Patient falls</p> <p>Pressure ulcers/ skin integrity</p> <p>Deep vein thrombosis</p> <p>Transfusion reaction</p>

(continued)

Table 3. Continued.

Subsystems	Dimensions	Variables and indicators (Variables in bold, Indicators in bullet form)
Patient comfort and quality of life-related to care	<ul style="list-style-type: none"> Symptoms management Physical and chemical restraints Incontinence 	Vascular access-related complications and infections <ul style="list-style-type: none"> Vascular access infiltration Intravenous infections Central line catheter-associated infection
	Patient functional status	<ul style="list-style-type: none"> Physical functional capacity Cognitive and psychosocial functional capacity
Patient empowerment	Ability to achieve appropriate self-care. <ul style="list-style-type: none"> Self-care status Patient's knowledge Satisfaction Domains of patient satisfaction Patient activation and engagement Patient experiences Complaints 	Adoption of health-promoting behaviors
Patient satisfaction	Healthcare utilization <ul style="list-style-type: none"> Use of emergency department Hospitalization (avoidable hospitalization) Readmission rates 	Length of stay Failure to rescue Mortality <ul style="list-style-type: none"> Mortality rate (based on timeframe)
Joint contribution (nursing and other care systems)	<ul style="list-style-type: none"> Use of emergency department Hospitalization (avoidable hospitalization) Readmission rates 	



Figure 3. Nursing-Sensitive Indicators for NIA prioritization from nurses' perspective. The larger the distinction in the size of the words the higher the frequency it was mentioned in the documents collated from the nurses during the workshop. The word cloud was created using <https://wordart.com>.

different codes with definitions. By clarifying the terminological inconsistencies associated with these indicators, the study contributes to harmonizing the understanding and categorization of NSIs, thereby improving the clarity and comparability of quality indicators in different settings.

The priority given to the nursing staff level indicator locally is well-supported and consistent with evidence that a strong workforce is crucial for optimal patient outcomes (Afaneh et al., 2021; Dubois et al., 2013; Goh et al., 2020; Scheel-Sailer et al., 2022). While patient characteristics influence adverse outcomes, nurses' organizational citizenship behavior has also been shown to impact nursing care quality, patient satisfaction, and the well-being of nurses (Mazzetti et al., 2022; Mitchell et al., 2024). Research proves that the perceived differential treatment by nursing managers has an impact on this behavior more than the quality of this relationship (Mitchell et al., 2024). Leadership strategies such as just resource allocation and involvement of frontline nurses in administrative decision-making can minimize this disparity in perceived treatment differentiation and can lead to tangible improvement in care quality.

The predominant focus of local indicators on outcome or structural metrics, as opposed to patient-centered metrics, is likely due to a greater emphasis on clinical outcomes and structural development. For example, NSIs such as nursing education highlight the emphasis given to empower nurses to stay clinically relevant and ensure professional development is at par with the latest practice. Additionally, by empowering nurses with the right knowledge and training, patient education can be delivered in an effective manner which indirectly influences patient outcomes and care quality. However, the lack of adherence to process indicators may obscure the true intent of promoting quality care because

missed nursing care has caused substantial issues in health-care, as demonstrated by Griffiths et al. (2018) and Whitehead et al. (2019). By organizing frequent stakeholder engagement, the importance of considering structural, process, and outcome indicators as interconnected elements in promoting quality care was conveyed. Despite the active engagement of nurses in maternal and child health activities and various other process indicators, these efforts needed to be adequately reflected as NSIs. Through our continuous advocacy, stakeholders recognized the significance of incorporating nursing care processes as NSIs and identified this area as important for prioritization during the workshop.

During the review, the authors found that all 64 studies had at least one outcome indicator capturing underscoring its comprehensive nature. The relevance of this indicator in many aspects of patient care provides an overview of nursing care which makes it valuable to measure general quality improvement. A recent study conducted in Jordan highlighted that more than a third of identified NSIs for the country were outcome indicators (Afaneh et al., 2024). In Malaysia, nurses are primarily responsible for medication administration in the inpatient setting, and prioritizing medication error as an area of concern for NSIs enhances accountability within the profession which fosters improvement in care delivery. Nurses are central to the tenets of healthcare and work closely with a range of healthcare professionals. The collective effort that is developed by utilizing NSIs promotes a team-based approach to healthcare delivery as this encourages communication and cooperation among different actors in the system. This holistic approach improves patient safety and provides enhanced care quality and information to policymakers for making data-driven decisions on resource allocation. Additionally, the roles that nurses play in providing health promotion and prevention information to patients can

reduce disease burden and provide empowerment to patients. By identifying the best practices and patient care standards, policies and strategies can be curated to not only impact the public health ecosystem here but also improve healthcare equity. Access to care and health disparity that often affect the vulnerable population is minimized and standardized care with resources which are allocated to areas that are in dire need ultimately improves patient engagement and satisfaction.

Malaysia's diverse population provides unique cultural and socioeconomic factors that can provide a rich context for developing adaptable NSIs that could be beneficial in other multicultural settings. Whilst the limitations in resources could dampen the implementation of technological advancement in most healthcare settings in Malaysia, the growing investment and stance by the Ministry of Health in healthcare digitalization provides an opportunity for the integration of NSIs, such as nursing care plans, in the healthcare landscape. This could stimulate nursing research by utilizing health registry data that contain patient-reported outcomes from a nursing perspective to improve nursing care quality (Hakami et al., 2023). Technology presence could also be used to protect NSI by implementing strict access controls, data protection with encryption, and regular audits to ensure patient privacy and security are not breached. The strength of this study lies primarily in its involvement of stakeholders and implementers in its methodology. Information captured in local facilities that need to be documented formally might have gone unnoticed without directly engaging stakeholders. By engaging a broad range of nurses, researchers, and policymakers, the study has fostered a more informed and contextual understanding of NSIs. Secondly, data collection was conducted using the snowball approach, which was instrumental in identifying and engaging nursing personnel for on-site data collection. The integration of literature review and grey literature has enabled the development of an evidence base. This method ensured the quality and relevance of the data collected and promoted a deeper understanding of the different dynamics in nursing across various healthcare settings in Malaysia. It contributed to a more grounded analysis of priority areas of NSI development. Doody et al. (2019), Gathara et al. (2020), El-Jardali et al. (2023), and Robson et al. (2023) have highlighted how this process is critical to the development of a robust and applicable national framework for nursing indicators.

On the other hand, there are limitations in this study. First, the study focuses on providing an evidence base tailored to the public health sector in Malaysia, which may impede the general transferability of findings to other health contexts with different socio-political and economic dynamics. Search engines, especially Google Search, are known to display selective information through algorithms that have been personalized to users. This effect, commonly known as the bubble effect, could have resulted in a selection bias in articles searched through Google. While the inclusion of stakeholders in this process of identifying NIA is highlighted as the strength of the study, several biases should be

acknowledged. The participant pool which included nurses from administrators to frontliners could have benefited by including nurses from all care disciplines and urban-rural settings. The presence of senior nurses who are policymakers in workshops might have also led to expert dominance which could have led to socially desirable or nonresponses amongst some participants.

Implications for Practice

Policy areas that cover patient safety, care quality, staffing levels, and resource allocation can be influenced by the findings as robust NSIs can guide daily administrative and operational decisions such as nursing staff assignments, care pathway protocols, and resource distribution. Areas of concern and the NSI list incorporated a mechanism that included systematic engagement processes such as stakeholder engagements, expert consultations, and iterative feedback loops which ensured all perspectives were considered.

Future research can incorporate a feasibility study that identifies the strengths and weaknesses of the NSIs can aid in ensuring effective implementation and encourage scalability. Resource limitations and variations in different regions, availability of technology, awareness towards NSIs, nursing education, and training are some factors that influence the rollout of NSIs and the scalability of these indicators. Addressing these factors while evaluating the benefits such as improvement in patient outcomes and enhanced healthcare quality can guide stakeholders in the decision-making process. Continuous evaluation and discussion of these NSIs in the current national quality forum amongst policymakers and nursing managers can serve as a platform to ensure the relevance of NSIs in an evolving healthcare ecosystem.

This study's findings can inform the work of researchers, policymakers, and stakeholders to promote the stakeholder-led approach methodology to synthesize evidence that can be translated into practice. The results will be beneficial for nurse managers to design indicators and assessment tools necessary for NIA development and to select appropriate NSIs in their local settings. Future research can test and adapt this approach in different settings to strengthen evidence-based policymaking. Through this study, we emphasize the importance of frequent stakeholder engagement to increase the likelihood of knowledge translation.

Conclusion

In conclusion, this study provides an initial list of the existing research on NSIs and provides the details relevant to it. It lays the foundation for further dialogues among stakeholders, policymakers, and practitioners to collaboratively improve the quality and safety of nursing care in Malaysia. The study also highlights the iterative approach in identifying critical areas of concern emphasizing the importance of stakeholder

engagement through a collaborative process. By identifying gaps and establishing an evidence base tailored to the local context through evidence synthesis, stakeholders can formulate strategies that align with the priority setting to enhance the quality of nursing care.

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Authors' Contribution

The role of authors and the contribution listed here is according to the criteria set by CrediT. Devi Shantini Rata Mohan contributed to conceptualization, methodology, formal analysis, investigation, project administration, visualization, writing—original draft preparation, and writing—reviewing and editing. Nurul Iman Jamalul-lail contributed to conceptualization, methodology, formal analysis, investigation, writing—original draft preparation, and writing—reviewing and editing. Diane Woei-Quan Chong contributed to conceptualization, methodology, formal analysis, investigation, supervision, writing—original draft preparation, and writing—reviewing and editing. Kalvina Chelladorai contributed to methodology, formal analysis, investigation, and writing—reviewing and editing. Kartiekasari Syahidda Mohammad Zubairi contributed to formal analysis, investigation, and writing—reviewing and editing. Inin Roslyza Rusli contributed to formal analysis, investigation, and writing—reviewing and editing. Nur Azmiah Zainuddin contributed to formal analysis, investigation, and writing—reviewing and editing. Roslina Supadi contributed to formal analysis, investigation, and writing—reviewing and editing. Noor Hasidah Ab Rahman contributed to formal analysis, investigation, and writing—reviewing and editing. Mariyah Mohamad contributed to formal analysis, investigation, and writing—reviewing and editing. Devi K. Saravana Muthu contributed to conceptualization, methodology, resources, and writing—reviewing and editing. Gowry Narayanan contributed to conceptualization, methodology, resources, and writing—reviewing and editing. Cheah Jenny contributed to conceptualization, methodology, resources, and writing—reviewing and editing.

Availability of Data and Materials

This study was registered with the National Medical Research Register (NMRR ID-23-01449-ICT). The review protocol is available upon request from the author. Data generated or analyzed throughout this study are included in this article in a brief manner to ease comprehension. A detailed summary of all indicators, including their definitions and calculation methods where applicable, is available upon request from the authors. Stakeholder documents are available upon request from the corresponding author on reasonable request and permission from the Director-General of Health, Malaysia. A brief description of the gathered indicators is categorized by their respective subsystems, dimensions, and variables.

Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Ethics Approval

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Supplemental Material

Supplemental material for this article is available online.

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