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Review

Metrics used by nurse practitioners to evaluate the impact of their role: A scoping review



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ABSTRACT

Background: The link between the care provided by nurse practitioners and its impact on patient outcomes is not clear.

Aim: To identify what metrics are currently being used by nurse practitioners to evaluate their practice.

Design: Scoping review guided by Joanna Briggs Institute methodology.

Methods: The population, concept, and context framework was used to guide keyword and index terms used. Metrics used to evaluate nurse practitioner practice and methods used in quantitative and qualitative studies, published in English between 2017 and 2023, were included. A content analysis was performed to identify metrics common to all nurse practitioners.

Data sources: Medline, CINAHL, Embase, and the Joanna Briggs Institute Evidence-Based Practice Database were searched in July 2024. Grey literature was identified by searching Open Dissertations and Google Scholar.

Results: Of the 2742 articles identified, 83 met the aim of this review. Most publications originated from the United States (n=46). No studies indicated consumer involvement in study design. Data analysis of the 294 metrics identified 17 themes. All themes were aligned to Donabedian's categories of structure (n=2), process (n=9), and outcome (n=6).

Conclusions: Nurse practitioners are evaluating their specialty practice using a variety of metrics via quality assurance and observational design where the comparator is medicine. A lack of consumer involvement in practice evaluation was noted in this review. Metrics, co-designed with consumers, that measure nurse practitioner practice regardless of specialty is lacking throughout the literature and is desperately needed.

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Summary of relevance**Problem or Issue**

There is an absence of nurse practitioner quality-of-care metrics that can be used by all nurse practitioners, regardless of speciality area, to demonstrate the impact of the role more broadly.

What is already known

Nurse practitioners have been evaluating the benefits and impact of their practice according to their speciality area of practice.

What this paper adds

This review identified 17 themes highlighting similarities in metrics used by all nurse practitioner roles that can support a consistent approach to evaluation. Future studies evaluating nurse practitioner practice can use metrics derived from the 17 themes to allow pooling of data to demonstrate the true impact of the role. Further, the collection of data at a local level, aligning the metrics used to the themes, will allow for early identification of care that can be improved, leading to better patient outcomes.

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1. Background

The link between the care provided by the nurse practitioner (NP) role and its impact on patient outcomes is not as well defined as it has been for registered nurses or medicine, and it needs to be made clear. Nursing-sensitive indicators have been studied extensively for registered nurses and provide a mechanism to measure the quality of nursing care by focusing on nurse-delivered outcomes (Foulkes, 2011; Oner et al., 2021). Common nursing-sensitive outcomes include falls, health care-associated infections, pressure ulcers, and patient satisfaction (Foulkes, 2011; Oner et al., 2021). Doctors have been able to show a direct link between the care they provide to patients and its impact on mortality, morbidity, and readmission rates (Kapu & Kleinpell, 2013). Indicators of quality care that demonstrate the broader NP role's impact on patient outcomes and the health care system are yet to be determined. Doing so will allow policymakers and health care executives to make informed decisions regarding how the role can be used to best meet the health care needs of individuals and populations.

There is a large body of literature demonstrating the benefits of NPs (Dierick-Van Daele, Metsemakers, Derckx, Spreeuwenberg, & Vrijhoef, 2009; Jennings, Gardner, O'Reilly, & Mitra, 2015; McDevitt & Melby, 2015; Stanley, Worrall-Carter, Rahman, McEvedy, & Langham, 2015; Yang, Idzik, Nelson, & McSweeney-Feld, 2023). However, these benefits are presented from specific areas of practice (e.g., emergency care, primary care, aged care) rather than the NP role collectively. Stanley et al. (2015) demonstrated improved patient satisfaction and quality of life for patients on dialysis receiving care from an established NP model of care in renal dialysis. NPs in aged care settings have demonstrated reduced resident hospitalisations and staff turnover rates (Yang et al., 2023). NPs in the primary care setting have shown that they provide care that is comparable to that of general practitioners (Dierick-Van Daele et al., 2009). NPs in emergency and urgent care have demonstrated improved patient satisfaction, reduced time to be seen, decreased length of stay, and superior management of pain (Jennings et al., 2015; McDevitt & Melby, 2015). Apart from the patient satisfaction indicator, the metrics used in these papers to evaluate the NP role align more closely with medicine. While the NP role is grounded in nursing theory (Nursing and Midwifery Board of Australia, 2021), these papers highlight that specific

NP metrics capturing the level of accountability and responsibility required of the extended scope of practice, to meet the needs of individuals and populations, regardless of speciality area, are needed. The identification of NP metrics will provide a consistent data set to guide evaluation rather than focusing on specific aspects of the NP role. This, in turn, will allow NPs to collectively demonstrate their true value and impact on the health care system.

The first NP roles were implemented in the United States in 1965 in response to increased demands for safe, affordable, quality health care in rural areas (Cooper, McDowell, & Raeside, 2019). Since this time, the NP role has been introduced into the health systems of many countries. NPs in Canada were established in the late 1960s, in the United Kingdom in the 1990s, and in Australia, the first NP was endorsed in December 2001 (Bryce, Foley, & Reeves, 2015). NP roles have been conceptualised differently throughout the world. These variations relate to the training, authority to practice requirements, scope of practice, and function of the role. In America, nurses must complete an NP master's or doctoral nursing program (American Association of Nurse Practitioners, 2023), whereas the minimum education standard in Taiwan is a hospital-based, accredited training program (Huang, Hsieh, & van de Mortel, 2019). In the United Kingdom, there is no regulatory protection for the title, with no legislation regarding minimum educational preparation for NPs and regulation of advanced practice nursing programs of study (Palmer, Julian, & Vaughan, 2023). The scope of practice for NPs in America is based upon patient needs (American Association of Nurse Practitioners, 2022). As such, an NP's role certification, licensure, and education must correspond to one of the six population foci (American Association of Nurse Practitioners, 2022), these being family/individual across the lifespan, adult-gerontology, paediatrics, neonatal, women's health/gender-related, or psychiatric mental health (American Association of Nurse Practitioners, 2022).

In Australia, an NPs scope of practice builds upon that of the registered nurse and must align with the NP Standards for Practice (Nursing and Midwifery Board of Australia, 2021). NPs are required to undertake a Master's program to develop advanced generalist knowledge and skills (Thompson, 2020). Legislative barriers at the Federal and State levels, at the time the role was implemented, led to roles being developed to address service needs within hospitals rather than focusing on population needs. This has resulted in the proliferation of numerous specialist and subspecialist NP roles. To address these challenges (e.g., acceptance of the role, educational preparation etc), work was undertaken in 2014 to develop an Australian NP taxonomy, similar to the population foci taxonomy used in the United States, to group specialties together that share similar knowledge, skills, and expertise (Gardner et al., 2014). Six metaspecialties were proposed at this time. In 2017, further research was undertaken to obtain consensus for the six metaspecialties (Helms, Gardner, & McInnes, 2017). The six accepted metaspecialties are aged and palliative care, child and family care, chronic and complex care, emergency and acute care, mental health care, and primary health care (Helms et al., 2017). These variations and inconsistencies make international comparisons difficult and have contributed to a lack of common metrics to evaluate the impact of NP care.

Despite these variations, NPs are trained to perform advanced health assessments, diagnose, and treat conditions according to their scope of practice (International Council of Nurses, 2020). Given these commonalities, it should be possible to demonstrate the impact of all NP roles by identifying and using common or similar metrics to measure this. In Australia, research into the development and use of NP clinical indicators has been highlighted in the 2023 Nurse Practitioner Workforce Plan as a key action to increase awareness of the workforce and to guide future investments and support (Department of Health and Aged Care, 2023). This research is yet to be conducted. Two resources were located to guide NPs on what indicators to use to evaluate their practice – the AUSPRAC NP research toolkit

Table 1
Eligibility criteria.

Inclusion	Exclusion
<p>Population of interest:</p> <ul style="list-style-type: none"> • Nurse practitioners delivering care to consumers <p>Concept:</p> <ul style="list-style-type: none"> • Any metrics, methods and instruments used in a study to evaluate the impact of nurse practitioner practice <p>Context:</p> <ul style="list-style-type: none"> • Any health care setting • Any area of specialty nurse practitioner practice <p>Other:</p> <ul style="list-style-type: none"> • Quantitative and qualitative research • English language 	<p>Population of interest:</p> <ul style="list-style-type: none"> • Nurse practitioner students (however termed) • Other advanced practice nursing roles <p>Concept:</p> <ul style="list-style-type: none"> • Any other concept focus (e.g. capability, training) <p>Context:</p> <ul style="list-style-type: none"> • Nil <p>Other:</p> <ul style="list-style-type: none"> • Case reports • Text, commentary or opinion pieces • Protocols • Business case or needs analysis reports for NP implementation • Abstract only publications

(Gardner, Gardner, Middleton, & Della, 2009) and the Nurse Practitioner Sensitive Outcomes report developed by the College of Registered Nurses of Nova Scotia, 2016.

The AUSPRAC toolkit provides several tools and instruments NPs can use to collect data when evaluating their service. However, at the time of this resource’s development, the NP landscape in Australia was vastly different and has undergone many changes. Since 2009, when the AUSPRAC tool was released, regulation of NPs occurs at a national rather than a state and territory level. In 2010, legislation was passed that allowed for certain medications prescribed by NPs to be subsidised under the Pharmaceutical Benefits Scheme, and to access Medicare Benefit Scheme rebates for a select few item numbers (Chiarella, Currie, & Wand, 2020), meaning NPs can now receive federal funding for some of their practice. To access these rebates, NPs were required to have a legally mandated collaborative arrangement in place with a specified medical practitioner (Chiarella et al., 2020). However, in 2024, the legislated need for these arrangements was removed (Department of Health and Aged Care, 2025). These changes suggest that the AUSPRAC toolkit may not reflect contemporary NP practice.

The report developed by the College of Registered Nurses of Nova Scotia, 2016 provides a summary of research findings relating to NP-sensitive outcomes. The included studies explored specific areas of NP practice (e.g., acute, primary, cardiac, emergency, etc) rather than identifying indicators for the broader NP role. No recommendations were made for which indicators should be used to evaluate practice. The identification of NP metrics would enable different NP roles to use similar indicators, and by doing so, would demonstrate the true impact on the quality and safety of care provided, regardless of the area of practice.

1.1. Evaluation of quality

When formally evaluating the quality and safety of health care, several terms are used. These include care indicators, clinical indicators, and quality indicators. Clinical indicator is often used interchangeably with care indicator and is a measure of the management or outcome of care provided, irrespective of the discipline providing the care (response to Q10). Quality indicators measure the quality of health care provision (The Organisation for Economic Development, 2016). At the clinician level, specifically nursing, the term nursing-sensitive indicator is used. Nursing-sensitive indicators are measures of specific patient care that are directly attributable to the nursing profession (Oner et al., 2021). As all these indicators are a measure of performance or health care outcome, the term *metric* will be used in this review to capture all terms. Similarly, the term *consumer* will be used throughout to refer to any patient, care resident, client, or other person receiving care, including carers and family members.

Compounding the lack of recognised NP metrics is an inconsistent approach to evaluation. Many studies have not indicated a guiding framework when conducting evaluative studies of NP

impact, rather choosing measures common to their area of speciality practice or local drivers (Jennings et al., 2015; Stanley et al., 2015). Other studies have used Donabedian’s framework, or aspects of the framework, to guide evaluation (Dierick-Van Daele et al., 2009; Dwyer, Craswell, Rossi, & Holzberger, 2017). The Donabedian (1988) framework is an established approach to guide and evaluate the quality of health care. The framework classifies characteristics of care under three major categories: structure, process, and outcome (Donabedian, 1988). These discrete categories are interconnected. Explicit within the framework is the assumption that the quality of care can be optimised by improving structures, which in turn improve processes, which leads to improved outcomes. Given the inconsistent approach to NP evaluation, which is often influenced by local drivers, it makes it difficult to determine if NPs, regardless of area of practice, are having a similar impact on quality and safety.

Organisations and policymakers use structure, process, and outcomes to evaluate the quality of care provided, to assess clinical performance, and inform decision-making related to resource and funding allocation (Oner et al., 2021). Identifying speciality NP practice outcomes can influence decision makers regarding role development and implementation at a local organisational level, yet may have little influence on policymakers at a federal level where health care services are predominantly funded (Department of Health and Aged Care, 2023). For the NP role, the ability to demonstrate the contributions that the role brings to health care is limited and desperately needed.

2. Aim

This scoping review sought to identify the metrics used by NPs to evaluate their practice and describe how they are currently being collected.

The question being asked in this review was:

1. What metrics and methods are used to evaluate the impact of NPs on the structure, processes, and outcomes of care?
Subsidiary question:
2. What metrics are common to all NP roles regardless of speciality area?

3. Methods

3.1. Design

As the aim of this review was to identify key metrics relating to how NPs evaluate their practice, it was appropriate to use a scoping review design (Munn et al., 2018). The review design was guided by the Joanna Briggs Institute methodology for scoping reviews (Peters, Godfrey, McInerney, Baldini Soares, & Khalil, 2020) and registered with Open Science Framework registries (osf.io/tjeyc).

3.2. Inclusion and exclusion criteria

The population, concept, context framework was adopted to construct eligibility criteria to guide the search strategy (see Table 1). The population of interest was NPs from any specialty area providing care to consumers. If the authors defined the clinician as an NP (stated explicitly), they were deemed to have met the population of interest inclusion criteria. Papers including NP students or other advanced practice nursing roles where results could not be attributed to NPs alone were excluded. The concept of interest of this review relates to any metric or approach used in a study to evaluate the impact of NP practice. Papers were excluded on the basis of a wrong concept if the focus was to explore other factors of the NP role (such as capability or training). The context referred to any health care service (e.g., acute setting, primary care setting, private, aged care setting, etc). Any qualitative or quantitative research published in English was included in the study. Other exclusion criteria included any conference abstracts, protocols, editorials, discussions, and opinion papers, as they were considered to have insufficient information.

3.3. Search methods

An initial search strategy was developed by the primary author (in consultation with a librarian) using the population, concept, context framework to identify published or unpublished quantitative and qualitative studies that presented original data to support their findings.

An initial search of Medline and Cumulative Index to Nursing & Allied Health (CINAHL) was performed to find NP evaluation studies to identify relevant keywords and index terms for the comprehensive full search strategy. The full search strategy was then applied to Medline, CINAHL, Embase, and the Joanna Briggs Institute Evidence Based Practice Database in July 2024. The Medline OVID search string is provided in [Supplementary Material file 1](#).

Grey literature was identified by searching Open Dissertations and Google Scholar. Reference lists of systematic and scoping reviews, discovered at the full-text screening phase, were also subject to the full screening process.

Studies were limited to those published in English. To reflect contemporary NP practice, a pragmatic decision was made to apply a year limit of between 1 January 2017 to 31 December 2023. This timeline was chosen following the [College of Registered Nurses of Nova Scotia, 2016](#) report on NP-sensitive outcomes, and the rationale that metrics demonstrating good utility would be continuously used in contemporary practice, while metrics with poor utility would become obsolete.

A data extraction tool was developed by the investigative team to guide data collection relating to population, concept, context framework and key findings relevant to this review. The extracted data included author, publication year, country of origin, aim, purpose of study, alignment to NP metaspécialty, study design and data source, number of NPs included in the study, comparator, evidence of consumer participation in evaluation design, and reported metrics. As there is no current acceptable framework available allowing for comparisons of NP roles internationally, the decision was made to align the included papers to the Australian metaspécialty framework. This framework considers factors used in other countries to categorise NPs, such as *population* used in the USA ([American Association of Nurse Practitioners, 2022](#)), and *location*, such as *acute or primary health care*, which is often used to categorise NPs in Canada ([DiCenso et al., 2010](#)). The Australian metaspécialty framework considers these factors but also incorporates the specialty area ([Helms et al., 2017](#)). Included papers were examined to identify the consumer focus, condition or body system foci, location of care delivery, and then matched to the relevant metaspécialty. For example,

if the population of interest was children admitted to a hospital for a surgical procedure, the paper would align with the *child and family health care* metaspécialty and the *emergency and acute care* metaspécialty. Alternatively, if the focus was children presenting to a primary health clinic for review of their asthma management, the paper would align with the *child and family health care* metaspécialty and the *primary health care* metaspécialty.

Titles and abstracts were screened first followed by full text. Both screening stages followed the same process. Ten percent of papers were screened by four reviewers to determine their relevance to the review and assess intra-rater reliability. Four rounds were required to reach a threshold agreement of 95%. A single researcher then completed the remaining title and abstract screening, as well as the full-text screening. Any uncertainty regarding the retrieved papers was discussed with a second member of the investigative team.

To assist with data synthesis, [Bengtsson's \(2016\)](#) four stages to concept analysis was performed by two of the investigators to group text and concepts together. The first stage – *decontextualization* – leads to the development of meaning units and codes by becoming familiar with the data to understand what is occurring so it can be broken down into smaller units. The second stage – *re-contextualization* – required two team members to re-read the responses alongside the meaning units and codes to ensure that all aspects of the data had been covered in relation to the study aim. The third stage – *categorisation* – required the codes and meaning units to be condensed and categorised into themes. The final stage – *compilation* – summarised the themes ([Bengtsson, 2016](#)). The concept analysis provided a uniform approach to chart the metrics used and link them to [Donabedian's \(1988\)](#) structure, process, outcome framework. For this study, [Donabedian's \(1988\)](#) definitions of structure, process, and outcome were used.

- Structure – Characteristics of the setting where the care was provided (e.g., organisation structures and hierarchy, equipment, human resources, characteristics of the NP role).
- Process – Activities and enablers (i.e., inputs) of service providers required to provide care (e.g., tasks, collaborations, referrals, costs).
- Outcome – Effect of the care provided to consumers relating to their health status (e.g. knowledge, behaviour, wellness).

3.4. Ethical considerations

Ethical approval was not required as there were no research participants in this review. The information collected is publicly available.

4. Results

4.1. Search outcome

The search strategy yielded 2742 citations. All citations were uploaded into Covidence (version 2974da970e19), where 54 duplicates were removed. The title and abstracts from the 2688 citations were reviewed against the eligibility criteria, and 503 progressed to full-text screening. The full-text review yielded 83 eligible citations.

Of the included studies, eight required discussion with a second member of the investigative team. The reasons for exclusion of articles at the full-text screening stage are reported in [Fig. 1 \(Tricco et al., 2018\)](#).

4.2. Characteristics of studies

Characteristics of all 83 studies were tabulated and can be viewed in [Supplementary Material file 2](#).

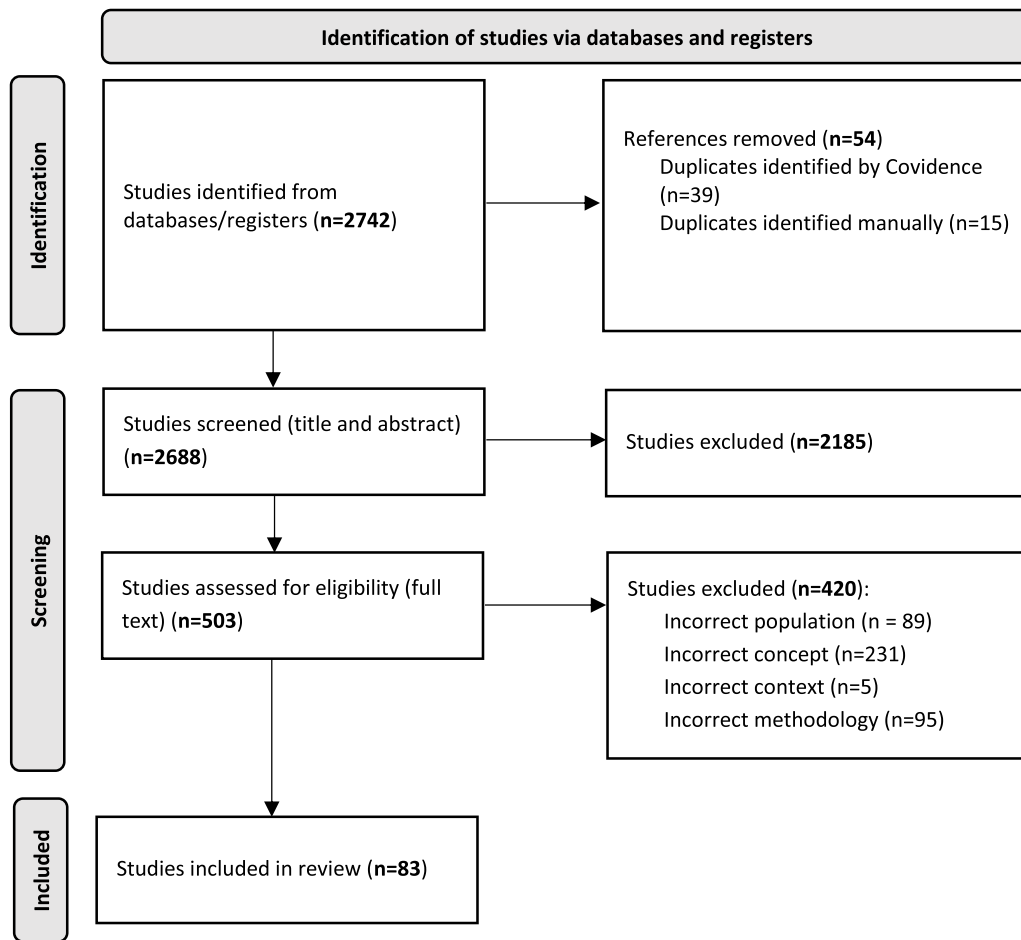


Fig. 1. Preferred Reporting Items for Systematic Reviews and Meta-analyses extension for scoping review (PRISMA-ScR) flow diagram.

Nine countries were represented in the sample with most publications originating from the USA (n=46), followed by Australia (n=14), the UK (n=6), Canada (n=5), Netherlands (n=4), Japan (n=3), Thailand (n=3), Saudi Arabia (n=1), and South Africa (n=1). The largest number of studies were published in 2018 (n=18), with the least number of articles being published in 2023 (n=6).

Chronic and complex care metaspecialty was represented in many papers (n=39), followed by emergency and acute care (n=38), primary health care (n=35), aged and palliative care (n=14), mental health care (n=7), and child and family health care represented in five papers. In 51 studies, NP practice aligned with two or more metaspecialties.

Study designs included quality assurance or audits (n=32), cohort studies (n=29), cross-sectional studies (n=6), randomised control trials (RCTs) (n=5), quasi-experimental studies (n=4), qualitative studies (n=6), economic evaluation (n=2), case series (n=1), and non-randomised experimental studies (n=1), with most of these being retrospective in nature (n=39).

Health services data (such as medical records, pathology files, finance files) were the most common source of data (n=55), followed by surveys (n=25) and third-party data (originating from government departments [e.g. Medicare], industry groups, or professional organisations) (n=15). The least common source was ‘time and motion’ observation (n=1), a type of quantitative data gathering (Kalne & Mehendale, 2022).

The NP role was compared to usual care in 14 papers. In many of the papers (n=63), the impact of NP practice was evaluated through comparison with other profession/s. The professions included medical roles of varying levels (n=46), physicians assistants (n=7),

health coaches (n=2), dentists (n=1), doctor of osteopathy (n=1), and naturopathic physicians (n=1). In four studies, the NP role was compared to other NP roles or models of care.

Two studies indicated that there was no consumer involvement in study design or planning. In the remaining 81 studies, there was no documented evidence of consumer participation in the study design or planning.

4.3. NP evaluation metrics

In total, 294 unique metrics were identified from the included studies. The concept analysis identified 17 themes. Data relating to the concept analysis decision-making process from meaning unit, to category, to theme can be found in Supplementary Material file 3. Table 2 illustrates the identified articles incorporating the metric themes, the theme’s description, and alignment to their classification according to Donabedian’s structure, process, and outcomes of care. Two themes aligned with Donabedian’s category structure, nine with process, and six with outcomes. Metrics aligned to health care setting theme (n=9) were the most used within structure. Duration of care theme (n=28) and consumer disposition theme (n=27) were most used regarding process metrics. Similarly, the themes unintended adverse outcomes (n=36) and consumer experience (n=27) were commonly used within outcome. Supplementary Material file 4 provides an expanded version of Table 2 incorporating metaspeciality and individual metric information.

Table 2
Metric themes aligned with structure, process, and outcome.

Donabedian Category	Theme: description	Articles incorporating theme
Structure	<p>Health care setting: The descriptive characteristics of the organisation where health care is provided. This could include location, services provided, complexity of services, and human resources available.</p> <p>Scope of practice: Descriptions of the types of conditions the NP role manages, non-direct care activities, governance and legislation authorising practice.</p>	<p>Farley et al. (2017); Jarczyk, Pieper, Brodie, Ezzell, and D'Alessandro (2018); Kilpatrick, Tchouaket, Jabbour, and Hains (2020); Middleton et al. (2019); Shand et al. (2020); Stefos, Moran, Poe, and Hooker (2022); Tchouaket et al. (2020); Uranaka, Takaira, Shinohara, and Yamagata (2021); Yang et al. (2023). Kilpatrick et al. (2020); Stefos et al. (2022); Tchouaket et al. (2020); Wong et al. (2018).</p>
Process	<p>Duration of care: Length of time that consumers are receiving care. This could include entire episodes of care or segments within the episode of care.</p> <p>Waiting time: Time that consumers are waiting to receive care or waiting for next segment of care to begin once decisions have been made (i.e., waiting for procedures to be performed, diagnosis once assessment and testing have been performed, transfer to another facility).</p> <p>Diagnostic assessment: Consumer assessment including collection of the consumer's history and physical examination. The act of the diagnostic assessment can occur in person, virtually, or via telephone consultation. Can relate to a number of assessments performed or accuracy of assessment performed.</p> <p>Diagnostic testing: The number and type of diagnostic tests (including imaging, pathology, and other tests) utilised by NPs.</p> <p>Diagnostic accuracy: The decision-making capacity of the NP to correctly interpret, diagnose.</p> <p>Pharmacological therapeutic management: The NPs capacity to prescribe medications. This can include type and number of medications prescribed and administered or de-prescribed, and medication reviews.</p> <p>Non-pharmacological therapeutic management: Activities NPs undertake when managing consumer care. This could include care coordination activities, intervention, and adherence to evidence-based guidelines.</p> <p>Consumer disposition: The disposition of consumers once the NP has finished providing care. Can include discharge and admission status of consumer, referral of consumer to another health care provider.</p> <p>Cost: The expenses or savings generated by organisations, consumers seen and treated by NPs.</p>	<p>Aiken et al. (2021); Arendts et al. (2018); Boltz, Cuellar, Cole, and Pistoresse (2019); Bonner et al. (2020); Chabra, Strandjord, and Peebles (2019); Chang, Tang, Wu, Pu, and Chen (2020); Coventry et al. (2017); Farley et al. (2017); Hardway, Lucente, A, Jarrouj, and Samanta (2023); Holliday et al. (2017); Huang et al. (2019); Jennings, Hollands, Keeler, Wenger, and Reuben (2020); Leask and Tennant (2019); Lutfiyya et al. (2017); Mahmud et al. (2019); Middleton et al. (2019); Moreton et al. (2020); Morgan et al. (2019); Mori et al. (2022); Nandwani, Clarke, Kuriakose, and Stevenson (2021); Patel et al. (2021); Roche et al. (2017); Sanko et al. (2020); Scherzer, Dennis, Swan, Kavuru, and Oxman (2017); Smits et al. (2020); Uranaka et al. (2021); van Leendert et al. (2021); Walling et al. (2017). Alfandy, Brecht, Cardin, and DeVon (2022); Hamdan, Walsh, Brignole, and Key (2018); Hardway et al. (2023); Jennings et al. (2020); Leask and Tennant (2019); Maselli et al. (2021); Middleton et al. (2019); Roche et al. (2017); Rothwell, McIltrout, and Khouri-Stevens (2018); Shand et al. (2020); van der Zalm et al., (2020). Boltz et al. (2019); Brown (2018); Buerhaus et al. (2018); Craswell, Dwyer, Rossi, Armstrong, and Akbar (2018); DesRoches, Clarke, Perloff, O'Reilly-Jacob, and Buerhaus (2017); Greenbank, Hemingway, Thiyagesh, and Stephenson (2020); Hamdan et al. (2018); Jones et al. (2017); Kurtzman and Barnow (2017); Leask and Tennant (2019); Lutfiyya et al. (2017); Mahmud et al. (2019); Mukai et al. (2021); Nelson, Bobade, Hunt, and Mundi (2018); Oatley and Fry (2020); Peter (2020); Rodgers, Stanton, and Jackson (2018); Sanko et al. (2020); Shand et al. (2020); Uranaka et al. (2021); van der Zalm et al., (2020); van Leendert et al. (2021); Walling et al. (2017); Wong et al. (2018). Brown (2018); Buerhaus et al. (2018); DesRoches et al. (2017); Faza et al. (2018); Hamdan et al. (2018); Jefferson and King (2018); Kurtzman and Barnow (2017); Liu et al. (2020); O'Reilly-Jacob, Perloff, and Buerhaus (2019); Oatley and Fry (2020); Schlabach, King, Browning, and Kue (2022); Shand et al. (2020); Uranaka et al. (2021); van der Zalm et al., (2020); Wong et al. (2018). Holliday et al. (2017); Machin (2017); Roche et al. (2017); Shand et al. (2020); Smits et al. (2020). Chabra et al. (2019); Fink, Deyo, Hallvik, and Hildebran (2018); Jiao, Murimi, Stafford, Mojtabai, and Alexander (2018); Kilpatrick et al. (2020); Kurtzman and Barnow (2017); Leask and Tennant (2019); Lutfiyya et al. (2017); Montejo, Richesson, Padilla, Zychowicz, and Hambley (2017); Mukai et al. (2021); Oatley and Fry (2020); Ruggiero, Pratt, and Antonelli (2019); Smits et al. (2020); Tchouaket et al. (2020); van Vugt et al. (2018); Wong et al. (2018). Brown (2018); Buerhaus et al. (2018); Coppa, Winchester, and Roberts (2018); DesRoches et al. (2017); Hardway et al. (2023); Holliday et al. (2017); Kilpatrick et al. (2020); Kurtzman and Barnow (2017); Leask and Tennant (2019); Machin (2017); Montejo et al. (2017); Moussa et al. (2022); Oatley and Fry (2020); Patel et al. (2021); Roche et al. (2017); Rothwell et al. (2018); Ruggiero et al. (2019); Shand et al. (2020); Smits et al. (2020); Uranaka et al. (2021); van Vugt et al. (2018); Walling et al. (2017); Wong et al. (2018). Arendts et al. (2018); Bonner et al. (2020); Chabra et al. (2019); Jennings et al. (2020); Jones et al. (2017); Kilpatrick et al. (2020); Kurtzman and Barnow (2017); Leask and Tennant (2019); Liu et al. (2020); Lutfiyya et al. (2017); Mahmud et al. (2019); Moreton et al. (2020); Morgan et al. (2019); Mori et al. (2022); Mukai et al. (2021); Nelson et al. (2018); Oatley and Fry (2020); Ruggiero et al. (2019); Sanko et al. (2020); Scherzer et al. (2017); Smits et al. (2020); Tchouaket et al. (2020); Uranaka et al. (2021); van Leendert et al. (2021); van Vugt et al. (2018); Walling et al. (2017); Wong et al. (2018). Aiken et al. (2021); Boltz et al. (2019); Coventry et al. (2017); Craswell et al. (2018); Hamdan et al. (2018); Jarczyk et al. (2018); Jefferson and King (2017); Jennings et al. (2020); Liu et al. (2020); Lutfiyya et al. (2021); Moreton et al. (2020); Morgan et al. (2019); Patel et al. (2021); Scherzer et al. (2017); Stefos et al. (2022); Tchouaket et al. (2020). Aiken et al. (2021); Alfandy et al. (2022); Boltz et al. (2019); Contandriopoulos, Bertoni, Duhoux, and Randhawa (2023); Cook,</p>
Outcome		

(continued on next page)

Table 2 (continued)

Donabedian Category	Theme: description	Articles incorporating theme
	Consumer experience: Consumer/family/carer satisfaction, perceptions of all interactions with health care organisations and NPs during their episode of care.	Mayahara, and Tivis (2023); Dwyer et al. (2017); Greenbank et al. (2020); Haas, Pozehl, Alonso, and Diederich (2023); Hu, Tung, Tsay, and Lin (2018); Jarczyk et al. (2018); Kippenbrock et al. (2019); Maselli et al. (2021); Masters, Weston, Chisholm, and Soanes (2019); Mukai et al. (2021); Nandwani et al. (2021); Nelson et al. (2018); Oatley and Fry (2020); Roche et al. (2017); Rose, Frith, and Zimmer (2021); Rothwell et al. (2018); Sanko et al. (2020); Shand et al. (2020); Smits et al. (2020); Smyth, Watson, Al Hamarneh, and Tsuyuki (2022); Wand et al. (2020); Wand et al. (2021); Wong et al. (2018); Yang et al. (2023).
	Staff experience: Health care staff satisfaction, perceptions of the NP role or NP model of care.	Aiken et al. (2021); Cook et al. (2023); Dwyer et al. (2017); Hu et al. (2018); Jones et al. (2017); Leask and Tennant (2019); Maselli et al. (2021); Masters et al. (2019); Peter (2020); Schlabach et al. (2022); Shand et al. (2020); Walling et al. (2017); Wand et al. (2020); Wand et al. (2021); Wong et al. (2018); Yang et al. (2023).
	Consumer health related behaviour: A consumer's action toward their own health. This can be framed positively such as treatment adherence or health seeking behaviours, or negatively such as non-adherence to treatment, not waiting to be seen by a clinician or not attending appointments.	Bonner et al. (2020); Buerhaus et al. (2018); Coppa et al. (2018); DesRoches et al. (2017); Faza et al. (2018); Hwang (2022); Jennings et al. (2020); Kattakuzhy et al. (2017); Leask and Tennant (2019); Liu et al. (2020); Mahmud et al. (2019); Maselli et al. (2021); Middleton et al. (2019); Morgan et al. (2019); Nelson et al. (2018); O'Toole, Chamberlain, and Giles (2020); Roche et al. (2017); Rodgers et al. (2018); Rothwell et al. (2018); Ruggiero et al. (2019); Sanko et al. (2020); Schlabach et al. (2022); Shand et al. (2020).
	Health status: How healthy consumers are. This can be framed in several ways. For example, how consumers perceive their own health, or using physiological or biological markers. It can be framed positively, such as treatment success, or negatively, such as treatment failure. When framed negatively it is due to disease processes rather than failures of clinicians/health care organisations.	Alfandy et al. (2022); Arendts et al. (2018); Bonner et al. (2020); Buerhaus et al. (2018); Contandriopoulos et al. (2023); Coppa et al. (2018); DesRoches et al. (2017); Farley et al. (2017); Faza et al. (2018); Feldman et al. (2020); Haas et al. (2023); Jackson et al. (2018); Kattakuzhy et al. (2017); Liu et al. (2020); Lutfiyya et al. (2017); Mahmud et al. (2019); Maselli et al. (2021); Moussa et al. (2022); Nelson et al. (2018); Roche et al. (2017); Schuttner et al. (2023); Smits et al. (2020); Smyth et al. (2022).
	Unintended adverse outcomes: Complications due to errors or omissions by clinicians or health care organisations leading to harm or injury.	Aiken et al. (2021); Arendts et al. (2018); Boltz et al. (2019); Buerhaus et al. (2018); Chabra et al. (2019); Coppa et al. (2018); Coventry et al. (2017); DesRoches et al. (2017); Fink et al. (2018); Holliday et al. (2017); Hu et al. (2018); Huang et al. (2019); Hwang (2022); Jefferson and King (2018); Jones et al. (2017); Kilpatrick et al. (2020); Lutfiyya et al. (2017); Mahmud et al. (2019); Maselli et al. (2021); Middleton et al. (2019); Mori et al. (2022); Moussa et al. (2022); Mukai et al. (2021); O'Toole et al. (2020); Osakwe, Barron, McDonald, and Feldman (2021); Patel et al. (2021); Roche et al. (2017); Rodgers et al. (2018); Rose et al. (2021); Ruggiero et al. (2019); Scherzer et al. (2017); Shand et al. (2020); Smits et al. (2020); Tchouaket et al. (2020); van Vugt et al. (2018); Yang et al. (2023).
	Mortality: Metrics relating to deaths, such as the number or location of death.	Aiken et al. (2021); Arendts et al. (2018); Boltz et al. (2019); Chabra et al. (2019); Chang et al. (2020); Coventry et al. (2017); Farley et al. (2017); Fink et al. (2018); Huang et al. (2019); Hwang (2022); Jefferson and King (2018); Jennings et al. (2020); Kilpatrick et al. (2020); Lutfiyya et al. (2017); Maselli et al. (2021); Moreton et al. (2020); Mori et al. (2022); Mukai et al. (2021); O'Toole et al. (2020); Patel et al. (2021); Sanko et al. (2020); Scherzer et al. (2017); Tchouaket et al. (2020); van Leendert et al. (2021).

Legend: NP = nurse practitioner.

4.4. Themes common to all NP metaspecialties

Table 3 compares the identified themes between metaspecialties. Of the 17 themes identified, seven were linked to all metaspecialties in the evaluation of their practice. These were waiting time, pharmacological therapeutic management, nonpharmacological management, consumer disposition, consumer experience, staff experience, and unintended adverse outcomes. *Emergency and acute care* and *primary health care* used metrics from all 17 themes, followed by the *chronic and complex care*, using metrics from 16 themes.

5. Discussion

This scoping review aimed to answer the primary question: *What metrics and methods are used to evaluate the impact of NPs on the structure, processes, and outcomes of care?* Our scoping review identified almost 300 metrics used to evaluate NP practice. Process and

outcome metrics, obtained using health services data, were more commonly compared with medicine mainly via quality assurance methods or retrospective observation study designs. A concept analysis was performed to answer our subsidiary question: *What metrics are common to all NP roles regardless of specialty area?* Seventeen themes were identified, seven of which were common to all NP metaspecialty groups to evaluate their care. The variety of metrics and themes identified is likely due to the variations in the role internationally relating to international differences in legislation and the scope of practice. The results of this review highlight several discussion points regarding how NPs currently evaluate their practice, relating to demonstration of impact and approach to evaluation that need to be considered.

Process and outcomes measures accounted for most of the metrics used by the studies when evaluated against the Donabedian framework (Donabedian, 1988). Structure metrics were used by only a few of the included articles. A possible reason for this is that while structure metrics may be easy to capture, implementing change

Table 3
Comparison of themes by Nurse Practitioner metaspecialty.

Theme	Aged & palliative care	Child & family health care	Chronic & complex care	Emergency & acute care	Mental health care	Primary health care
Structure						
Health care setting	•	•	•	•		•
Scope of practice	•	•	•	•	•	•
Process						
Duration of care	•	•	•	•		•
Waiting time	•	•	•	•		•
Diagnostic assessment	•	•	•	•	•	•
Diagnostic testing			•	•	•	•
Diagnostic accuracy				•		•
Pharmacological therapeutic management	•	•	•	•	•	•
Non-pharmacological therapeutic management	•	•	•	•	•	•
Consumer disposition	•	•	•	•	•	•
Cost	•	•	•	•	•	•
Outcome						
Consumer experience	•	•	•	•	•	•
Staff experience	•	•	•	•	•	•
Consumer health-related behaviour	•	•	•	•		
Health status	•	•	•	•	•	
Unintended adverse outcomes	•	•	•	•		
Mortality	•	•	•	•		

based on the results may not be possible (e.g., increasing nursing numbers due to nurse–patient ratios) or those that can be actioned are difficult to measure within existing databases (hospital information systems, electronic medical record systems) (Mountford & Shojanian, 2012). It should be noted that some studies provided this information in the background or setting section of the paper to help situate the results. However, as it was not the outcome under investigation, it was not included as a metric in this review.

Most *process* metrics used in the included studies involved frequency counts to report impact, for example, the number of investigative tests requested or the number of return visits to the emergency department (Kurtzman & Barnow, 2017). There was limited use of metrics evaluating diagnostic reasoning and accuracy, such as missed injury rates or control of HbA1C (Holliday, Samanta, Budinger, Hardway, & Bethea, 2017; Schuttner, Richardson, Parikh, & Wong, 2023), which would more directly demonstrate impact on health outcomes. Frequency count type metrics are consistent with health service data that is captured by organisations, reflecting process measures of quality. While the use of organisational data may be practical and efficient to collect for evaluation, any variations in quality may only be due to how one organisation collects, measures, and reports the information (Clarke, Conti, Wolters, & Steventon, 2019). The identification of agreed quality metrics is the first step toward establishing an NP evaluation framework with clear definitions and directions on data collection and reporting to promote consistency, allowing for comparisons to be made.

Common *outcome* metrics used in the included studies employed a combination of clinician-based measures (i.e., staff experience, unintended adverse outcomes, and mortality) and patient-reported measures (i.e., consumer experience, consumer health-related behaviour, and health status) to demonstrate the effect of the care provided to consumers by NPs. Patient-reported outcomes measures (PROMs) capture consumers' perceptions of their health status, and patient-reported experience measures (PREMs) gather consumers' experience of the care they received (Kingsley & Patel, 2017). Both PREM and PROM metrics are commonly collected via questionnaires that are completed by consumers (Kingsley & Patel, 2017). Using PROMs and PREMs to gather data to inform clinical practice is sensible given that consumers are the key stakeholders in health and central to the health care industry. However, recent studies have suggested that care should be taken when adopting them. Firstly, the capacity to use PROMs regularly is limited due to a lack of training

and support for clinicians on how to implement and use them, a lack of time to incorporate them into consumer consultations, and concerns for consumer burden associated with completing the questionnaires regularly (Lehmann et al., 2025). Secondly, questions have been raised concerning the inclusiveness of PREM questionnaires and that certain populations may be underrepresented (Sharma, Beadle, Caton, Farrington, & Radnor, 2024). Given that consumers may encounter a significant number of clinicians before completing these questionnaires, it could be argued that PROM and PREM metrics are not sensitive enough to attribute specific patient experiences and outcomes to a single clinician or specific role.

Many of the included papers evaluated the NP role by comparing metrics with usual care or medical roles. If the outcome under consideration is patient safety, rather than impact, then it is not unreasonable to compare NP practice to medicine. However, the purpose of many of the papers was to evaluate or determine the impact or outcomes of NP practice rather than safety. Some argue that caution should be taken when comparing the role to medicine. In the late 1970s, Prescott and Driscoll (1979) argued that comparing NP roles to medical roles suggests that medicine is the acceptable standard to evaluate the quality of NP care. Roche, Gardner, and Jack (2017) noted that while it is common to compare NPs to junior doctors, the two roles do not share the same experience, scope of practice, skills, and practice privileges. It could also be debated that if the outcome being observed is cost, consideration needs to be given to the level of doctor to which the NP is being compared.

Whilst it is acknowledged throughout the NP literature that aspects of the role overlap with medicine, the NP role provides something different. Studies have shown that NPs working in specialty areas provide more holistic care, spending more time with consumers, often on the same day as requested, which leads to greater consumer satisfaction and better outcomes (Dierick-Van Daele et al., 2009; Edwards, Bobb, & Robinson, 2009; Frost, Currie, Cruickshank, & Northam, 2017). It has also been well established, via systematic reviews, that NPs deliver equitable and, at times, better care when compared to medicine (Laurant et al., 2018), so it seems redundant to continue to compare the NP role to doctors. Continually comparing NPs to doctors, once the NP role or model of care has demonstrated benefits, suggests that NPs *are* doctors and does not account for the differences and benefits that both roles provide. The identification of common metrics relevant to all NPs regardless of specialty area will allow for targeted ongoing evaluation.

It is acknowledged that when a new model of care is introduced, it is usual to compare it to the current standard to ensure that the new model provides, at a minimum, equitable outcomes. It is at this time of role implementation that well-designed experimental studies should be adopted to clearly demonstrate causality and equitable outcomes. Experimental studies include RCTs, quasi-experimental and non-randomised control trials (Grimes & Schulz, 2002). Only 10 of the studies included in this review were experimental in nature. Determining causality based on quality assurance or observational data is difficult, yet many studies included in this review have used these designs to suggest that the impact observed was due to the NP role. The challenges and resources required to establish experimental studies are onerous, and it will not always be possible, or even desirable, for experimental studies to be performed for ongoing evaluation. Identification of robust common metrics that evaluate NP practice, at the time of implementation to demonstrate safety and impact, and then for ongoing dynamic evaluation, is desperately needed.

Whilst the introduction of the NP metaspecialty taxonomy in Australia has helped to group specialties together, the absence of agreed metrics has led to a haphazard approach to evaluation that makes comparisons between and within each metaspecialty difficult. This study identified that certain metrics within metaspecialties are common. Within the aged and palliative care metaspecialty, metric data relating to quality of life (Arendts et al., 2018; Dwyer et al., 2017), hospital transfers (Arendts et al., 2018; Tchouaket, Kilpatrick, & Jabbour, 2020), and death (Arendts et al., 2018; Tchouaket et al., 2020; van Leendert et al., 2021) were common in several studies. However, metric terminology differed between papers, and at times, definitions of the metric were missing. For example, hospital transfer data included *unplanned transfer to a hospital via the ED* (Arendts et al., 2018) or *transfers (short term)* (Tchouaket et al., 2020). While the broad concept is similar, it is difficult to determine if the data provided is capturing the same phenomenon. Although common metrics were identified within metaspecialties, metrics unique to only one study were also identified. For example, Tchouaket et al. (2020) also collected data concerning the number of medications consumed by residents. The question this raises is that if a metaspecialty has demonstrated the ability to collect data relating to a certain metric, is that metric unique only to the local setting, or is it a suitable metric that should be captured by all to evaluate impact? This further highlights the importance of developing agreed metrics that can be used by all NPs to ensure a consistent approach to evaluation and comparisons between organisations and geographical locations.

This review highlights a lack of studies that involved consumers in project design and evaluation. Jennings, Lee, Chao, and Keating (2009) suggest that patient satisfaction, as used by 20 studies included in this review, can be seen as the consumer's interpretation of the quality of care they received. While true, using Arnstein's ladder of citizen participation to define the level of consumer engagement, satisfaction can be considered to reach only the *consultation* rung, where consumers are seen and heard but no assurances are provided that their concerns will be considered and acted on (Arnstein, 1969). At a minimum, we should be aiming for *partnership* (rung 6 on Arnstein's ladder) when identifying what metrics are important to collect to evaluate NP practice. Partnership, in this sense, allows consumers to plan, engage, and negotiate with industry to achieve better outcomes (Holetzek & Holmberg, 2022).

This scoping review has demonstrated that metrics, co-designed with consumers, that measure the impact of the NP role regardless of specialty are lacking throughout the literature and are desperately needed. Until definitive NP metrics are developed, future studies should consider including metrics that align with the seven themes that were common to all NP metaspecialties to evaluate their practice.

6. Limitations

Despite searching four databases and Google Scholar, eligible studies may have been missed. Limiting the search to the English language may have prevented the identification of studies from a broader international perspective for inclusion. Choosing to start our search from 2017 may have also limited the inclusion of international papers published before 2017 that met our inclusion criteria. As the aim of this review was to identify the metrics currently being used to evaluate NP practice and not to determine the levels of support for a metric, the search strategy and identification of 83 papers have served their purpose of mapping contemporary NP practice.

For studies to be included in our review, the term *nurse practitioner* needed to be explicit in the article. This may have led to articles not being included as they used the term *advanced practice nurse*, or similar, to describe the role of NP. While it is acknowledged that the NP is considered an advanced practice role, advanced practice roles are many and varied (e.g., clinical nurse specialist, clinical nurse consultant). The variations in scope and function of these roles, compared to the NP role, are great and may be evaluated differently.

Because of the different regulations governing the NP role internationally, including studies from all countries that have incorporated NP roles into their health care system, could be seen as a limitation of this study and the validity of the results. The decision to include all countries was based on the common knowledge and skill set required of the NP role internationally, rather than legislation regulating the NP.

In the absence of a framework to guide categorisation of international NP roles, we chose to align NP roles and models of care to the Australian metaspecialty framework. This may draw criticism from the international NP community. However, categorising NP roles using this framework has served the purpose of allowing for comparisons required of this review and can provide an alternative for future evaluation of NPs internationally.

In keeping with scoping review methods, we did not include a quality appraisal of the evidence, which may be seen as a limitation. However, the aim was to identify the metrics, not to evaluate the capacity of the metric to measure or demonstrate the impact of the role, so an assessment of the quality of the study was not undertaken.

7. Conclusions

Our review identified a significant number of metrics spanning several themes used by NPs to evaluate their roles in specialty practice. The breadth of metrics and themes is likely due to the variations in the role internationally relating to legislation and scope of practice. Quality assurance and observational designs were mostly used to evaluate NP practice, where the comparator was medicine. Most of the metrics used are related to health service metrics targeting process and outcome measures according to Donabedian's quality framework. A limited number of themes highlighting similar metrics are used by all NP metaspecialties. This review identified a lack of consumer involvement in study design and evaluation. Quality-of-care metrics, co-designed with consumers, that measure the impact of the NP role regardless of specialty, are lacking throughout the literature and are desperately needed. This will allow for future longitudinal experimental research to be performed that demonstrates the real contribution NPs bring to the health care arena.

Authorship contribution statement

All authors have made substantial contributions to this article. JT: was responsible for conception and design of the study, data

extraction, data analysis and interpretation of data, and writing (original draft and reviewing and editing). DC contributed to the design of the study, data extraction (inter-rater reliability), data analysis, and writing (reviewing and editing). SK contributed to the design of the study, data extraction (inter-rater reliability), data analysis, and writing (reviewing and editing). SM contributed to the design of the study and writing (reviewing and editing). MG contributed to the design of the study, data extraction (inter-rater reliability), data analysis, and writing (reviewing and editing).

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Ethical statement

Ethical approval was not required as there were no research participants in this review. The information collected is publicly available.

Conflict of interest

The authors declare that they have no conflicts of interest.

Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.colegn.2025.04.004.

References

- Aiken, L. H., Sloane, D. M., Brom, H. M., Todd, B. A., Barnes, H., Cimiotti, J. P., et al. (2021). Value of nurse practitioner inpatient hospital staffing. *Medical Care*, 59, 857–863. <https://doi.org/10.1097/MLR.0000000000001628>
- Alfandy, F., Brecht, M. L., Cardin, S., & DeVon, H. A. (2022). Low-to-moderate risk transient ischemic attack patients can be safely discharged from the emergency department to a nurse practitioner-led clinic. *Journal of Neuroscience Nursing*, 54, 231–236. <https://doi.org/10.1097/jnn.0000000000000677>
- American Association of Nurse Practitioners (2022). *Discussion Paper: Standards of Practice for Nurse Practitioners*. American Association of Nurse Practitioners. Available from: (<https://storage.aanp.org/www/documents/advocacy/position-papers/Standards-of-Practice.pdf>) [Retrieved 23 March].
- American Association of Nurse Practitioners (2023). *All About Nurse Practitioners*. American Association of Nurse Practitioners. Available from: (<https://www.aanp.org/>) [Retrieved 3 June].
- Arendts, G., Deans, P., O'Brien, K., Etherton-Beer, C., Howard, K., Lewin, G., et al. (2018). A clinical trial of nurse practitioner care in residential aged care facilities. *Archives of Gerontology & Geriatrics*, 77, 129–132. <https://doi.org/10.1016/j.archger.2018.05.001>
- Arnstein, S. R. (1969). A ladder of citizen participation. *Journal of the American Institute of Planners*, 35, 216–224. <https://doi.org/10.1080/01944366908977225>
- Bengtsson, M. (2016). How to plan and perform a qualitative study using content analysis. *NursingPlus Open*, 2, 8–14. <https://doi.org/10.1016/j.npls.2016.01.001>
- Boltz, M., Cuellar, N. G., Cole, C., & Pistoresi, B. (2019). Comparing an on-site nurse practitioner with telemedicine physician support hospitalist programme with a traditional physician hospitalist programme. *Journal of Telemedicine & Telecare*, 25, 213–220. <https://doi.org/10.1177/1357633X18758744>
- Bonner, A., Havas, K., Stone, C., Abel, J., Barnes, M., Tam, V., et al. (2020). A multi-morbidity nurse practitioner-led clinic: evaluation of health outcomes. *Collegian*, 27, 430–436. <https://doi.org/10.1016/j.colegn.2019.11.010>
- Brown, C. A. (2018). Reducing outpatient antibiotic prescribing for acute respiratory infections: a quasi-experimental study. *Journal of Doctoral Nursing Practice*, 11, 3–15. <https://doi.org/10.1891/2380-9418.11.1.3>
- Bryce, J., Foley, E., & Reeves, J. (2015). In celebration of nurse practitioners. *Australian Nursing and Midwifery Journal*, 23, Article 1.
- Buerhaus, P., Perloff, J., Clarke, S., O'Reilly-Jacob, M., Zolotusky, G., & DesRoches, C. M. (2018). Quality of primary care provided to medicare beneficiaries by nurse practitioners and physicians. *Medical Care*, 56, 484–490. <https://doi.org/10.1097/mlr.0000000000000908>
- Chabra, S., Strandjord, T. P., & Peeples, E. S. (2019). Outcomes of extremely low birth weight infants in the NICU after initiation of a two-team care model. *Journal of Neonatal Nursing*, 25, 254–256. <https://doi.org/10.1016/j.jnn.2019.04.006>
- Chang, C. L., Tang, G. J., Wu, C. P., Pu, C., & Chen, H. C. (2020). The influence of nurse practitioner staffing on intensive care unit mortality. *Journal of the American Association of Nurse Practitioners*, 32, 252–260. <https://doi.org/10.1097/JJXX.0000000000000275>
- Chiarella, M., Currie, J., & Wand, T. (2020). Liability and collaborative arrangements for nurse practitioner practice in Australia. *Australian Health Review*, 44, 172–177. <https://doi.org/10.1071/ah19072>
- Clarke, G. M., Conti, S., Wolters, A. T., & Steventon, A. (2019). Evaluating the impact of healthcare interventions using routine data. *BMJ*, 365, Article I2239. <https://doi.org/10.1136/bmj.i2239>
- Australian Council on Healthcare Standards (2023). *ACHS Performance Data System*. In: Ultimo: Australian Council on Healthcare Standards. Available from: (<https://www.achs.org.au/>) [Accessed 27 June 2025].
- Contandriopoulos, D., Bertoni, K., Duhoux, A., & Randhawa, G. K. (2023). Pre-post analysis of the impact of British Columbia nurse practitioner primary care clinics on patient health and care experience. *BMJ Open*, 13, Article e072812. <https://doi.org/10.1136/bmjopen-2023-072812>
- Cook, K. L., Mayahara, M., & Tivis, L. (2023). Evaluation of the nurse practitioner offsite model. *Journal of Gerontological Nursing*, 49, 25–30. <https://doi.org/10.3928/00989134-20230615-05>
- Cooper, M. A., McDowell, J., & Raeside, L. (2019). The similarities and differences between advanced nurse practitioners and clinical nurse specialists. *British Journal of Nursing*, 28, 1308–1314. <https://doi.org/10.12968/bjon.2019.28.20.1308>
- Coppa, D., Winchester, S. B., & Roberts, M. B. (2018). Home-based nurse practitioners demonstrate reductions in rehospitalizations and emergency department visits in a clinically complex patient population through an academic-clinical partnership. *Journal of the American Association of Nurse Practitioners*, 30, 335–343. <https://doi.org/10.1097/JJXX.0000000000000060>
- Coventry, L. L., Pickles, S., Sin, M., Towell, A., Giles, M., Murray, K., et al. (2017). Impact of the Orthopaedic Nurse Practitioner role on acute hospital length of stay and cost-savings for patients with hip fracture: a retrospective cohort study. *Journal of Advanced Nursing*, 73, 2652–2663. <https://doi.org/10.1111/jan.13330>
- Craswell, A., Dwyer, T., Rossi, D., Armstrong, C., & Akbar, D. (2018). Cost-effectiveness of nurse practitioner-led regional titration service for heart failure patients. *The Journal for Nurse Practitioners*, 14, 105–111. <https://doi.org/10.1016/j.nurpra.2017.11.007>
- College of Registered Nurses of Nova Scotia (2016). *Nurse Practitioner-Sensitive Outcomes; 2016 Summary Report*. Nova Scotia College of Nursing. Available from: (www.crnns.ca/) [Accessed 10 January 2024].
- Department of Health and Aged Care (2023). *Nurse Practitioner Workforce Plan*. Australian Government. Available from: (<https://www.health.gov.au/sites/default/files/2023-05/nurse-practitioner-workforce-plan.pdf>) [Accessed 15 January 2025].
- Department of Health and Aged Care (2025). *Collaborative Arrangements*. Australian Government. Available from: (<https://www.health.gov.au/our-work/collaborative-arrangements>) [Retrieved 3 March 2025].
- DesRoches, C. M., Clarke, S., Perloff, J., O'Reilly-Jacob, M., & Buerhaus, P. (2017). The quality of primary care provided by nurse practitioners to vulnerable Medicare beneficiaries. *Nursing Outlook*, 65, 679–688. <https://doi.org/10.1016/j.outlook.2017.06.007>
- DiCenso, A., Martin-Misener, R., Bryant-Lukosius, D., Bourgeault, I., Kilpatrick, K., Donald, F., et al. (2010). Advanced practice nursing in Canada: overview of a decision support synthesis. *Nursing Leadership (Toronto, Ont.)*, 23, 15–34. <https://doi.org/10.12927/cjnl.2010.22267>
- Dierick-Van Daele, A. T. M., Metsemakers, J. F. M., Derckx, E. W. C. C., Spreeuwenberg, C., & Vrijhoef, H. J. M. (2009). Nurse practitioners substituting for general practitioners: randomized controlled trial. *Journal of Advanced Nursing*, 65, 391–401. <https://doi.org/10.1111/j.1365-2648.2008.04888.x>
- Donabedian, A. (1988). The quality of care. How can it be assessed? *JAMA*, 260, 1743–1748. <https://doi.org/10.1001/jama.260.12.1743>
- Dwyer, T., Craswell, A., Rossi, D., & Holzberger, D. (2017). Evaluation of an aged care nurse practitioner service: quality of care within a residential aged care facility hospital avoidance service. *BMC Health Services Research*, 17, 1–11. <https://doi.org/10.1186/s12913-017-1977-x>
- Edwards, M., Bobb, C., & Robinson, S. I. (2009). Nurse practitioner management of acute in-hours home visit or assessment requests: a pilot study. *British Journal of General Practice*, 59, 7–11. <https://doi.org/10.3399/bjgp09X394798>
- Farley, J. E., Ndjeka, N., Kelly, A. M., Whitehouse, E., Lachman, S., Budhathoki, C., et al. (2017). Evaluation of a nurse practitioner-physician task-sharing model for multi-drug-resistant tuberculosis in South Africa. *PLoS One*, 12, Article e0182780. <https://doi.org/10.1371/journal.pone.0182780>
- Faza, N. N., Akeroyd, J. M., Ramsey, D. J., Shah, T., Nasir, K., Deswal, A., et al. (2018). Effectiveness of NPs and PAs in managing diabetes and cardiovascular disease. *JGAA*, 31, 39–45. <https://doi.org/10.1097/01.JAA.00000534983.61613.91>
- Feldman, P. H., McDonald, M. V., Trachtenberg, M., Trifilio, M., Onorato, N., Sridharan, S., et al. (2020). Reducing hypertension in a poststroke black and hispanic home care population: results of a pragmatic randomized controlled trial. *American Journal of Hypertension*, 33, 362–370. <https://doi.org/10.1093/ajh/hpz148>
- Fink, P. B., Deyo, R. A., Hallvik, S. E., & Hildebran, C. (2018). Opioid prescribing patterns and patient outcomes by prescriber type in the Oregon Prescription Drug Monitoring Program. *Pain Medicine*, 19, 2481–2486. <https://doi.org/10.1093/pm/pnx283>
- Foulkes, M. (2011). Nursing metrics: measuring quality in patient care. *quiz 46 Nursing Standard*, 25, 40–45. <https://doi.org/10.7748/ns2011.06.25.42.40.c8582>
- Frost, J. S., Currie, M. J., Cruickshank, M., & Northam, H. L. (2017). Viewing nurse practitioners' perceptions of patient care through the lens of enablement. *Journal for Nurse Practitioners*, 13, 570–576. <https://doi.org/10.1016/j.nurpra.2017.06.020>
- Gardner, A., Gardner, G., Coyer, F., Henderson, A., Gosby, H., & Lenson, S. (2014). *Educating Nurse Practitioners: Advanced Specialty Competence, Clinical Learning and*

- Governance. Office for Learning and Teaching. Available from: (<https://nla.gov.au/anbd.bib-an000071970527>). [Accessed 10 January 2024].
- Greenbank, K., Hemingway, S., Thiyagesh, S., & Stephenson, J. (2020). Service user and carer experiences of the advanced nurse practitioner role in a memory assessment team. *British Journal of Nursing*, 29, 960–967. <https://doi.org/10.12968/bjon.2020.29.16.960>
- Grimes, D. A., & Schulz, K. F. (2002). An overview of clinical research: the lay of the land. *Lancet*, 359, 57–61. [https://doi.org/10.1016/S0140-6736\(02\)07283-5](https://doi.org/10.1016/S0140-6736(02)07283-5)
- Haas, D., Pozehl, B., Alonso, W. W., & Diederich, T. (2023). Patient satisfaction with a nurse practitioner-led heart failure clinic. *The Journal for Nurse Practitioners*, 19, Article 104496. <https://doi.org/10.1016/j.nurpra.2022.11.006>
- Hamdan, M. H., Walsh, K. E., Brignole, M., & Key, J. (2018). Outreach syncope clinic managed by a nurse practitioner: outcome and cost effectiveness. *Journal of Telemedicine & Telecare*, 24, 566–571. <https://doi.org/10.1177/1357633X17718087>
- Hardway, J., Lucente, F. C., A. T. C., Jarrouj, A., & Samanta, D. (2023). Impact of the 24/7 nurse practitioner model on emergency department stay at a level 1 trauma center: a retrospective study. *Journal of Clinical Nursing*, 32, 517–522. <https://doi.org/10.1111/jocn.16300>
- Helms, C., Gardner, A., & McInnes, E. (2017). Consensus on an Australian Nurse practitioner specialty framework using Delphi methodology: results from the CLLEVER 2 study. *Journal of Advanced Nursing*, 73, 433–447. <https://doi.org/10.1111/jan.13109>
- Holetzke, T., & Holmberg, C. (2022). Representation in participatory health care decision-making: reflections on an application-oriented model. *Health Expectations*, 25, 1444–1452. <https://doi.org/10.1111/hex.13483>
- Holliday, A., Samanta, D., Budinger, J., Hardway, J., & Bethea, A. (2017). An outcome analysis of nurse practitioners in acute care trauma services. *Journal of Trauma Nursing*, 24, 365–370. <https://doi.org/10.1097/JTN.0000000000000327>
- Hu, J. Y., Tung, H. H., Tsay, S. L., & Lin, W. C. (2018). An outcome analysis of nurse practitioner care in a community hospital in Taiwan. *Journal of the American Association of Nurse Practitioners*, 30, 464–471. <https://doi.org/10.1097/jxx.0000000000000066>
- Huang, M. H., Hsieh, H. Y., & van de Mortel, T. (2019). The impact of the addition of nurse practitioners to surgical intensive care units: a retrospective cohort study. *Australian Critical Care*, 32, 244–248. <https://doi.org/10.1016/j.aucc.2018.05.004>
- Hwang, P. J. (2022). Impact of NP follow-up calls on reducing 30-day readmissions in patients with stroke. *Nurse Practitioner*, 47, 39–46. <https://doi.org/10.1097/01.NPR.00000827056.81217.5b>
- Gardner, G., Gardner, A., Middleton, S., & Della, P. (2009). *The Nurse Practitioner Research Toolkit The Australian Nurse Practitioner Study (AUSPRAC)*. Available from: (<https://eprints.qut.edu.au/72604/1/72604.pdf>). [Accessed 3 March 2025].
- International Council of Nurses (2020). *Guidelines on Advanced Practice Nursing 2020*. International Council of Nurses. Available from: (<https://www.icn.ch/>).
- Jackson, G. L., Smith, V. A., Edelman, D., Woolson, S. L., Hendrix, C. C., Everett, C. M., et al. (2018). Intermediate diabetes outcomes in patients managed by physicians, nurse practitioners, or physician assistants: a cohort study. *Annals of Internal Medicine*, 169, 825–835. <https://doi.org/10.7326/M17-1987>
- Jarczyk, K. S., Pieper, P., Brodie, L., Ezzell, K., & D'Alessandro, T. (2018). An integrated nurse practitioner-run subspecialty referral program for incontinent children. *Journal of Pediatric Health Care*, 32, 184–194. <https://doi.org/10.1016/j.pedhc.2017.09.015>
- Jefferson, B. K., & King, J. E. (2018). Impact of the acute care nurse practitioner in reducing the number of unwarranted daily laboratory tests in the intensive care unit. *Journal of the American Association of Nurse Practitioners*, 30, 285–292. <https://doi.org/10.1097/JXX.0000000000000050>
- Jennings, N., Gardner, G., O'Reilly, G., & Mitra, B. (2015). Evaluating emergency nurse practitioner service effectiveness on achieving timely analgesia: a pragmatic randomized controlled trial. *Academic Emergency Medicine*, 22, 676–684. <https://doi.org/10.1111/acem.12687>
- Jennings, L. A., Hollands, S., Keeler, E., Wenger, N. S., & Reuben, D. B. (2020). The effects of dementia care co-management on acute care, hospice, and long-term care utilization. *Journal of the American Geriatrics Society*, 68, 2500–2507. <https://doi.org/10.1111/jgs.16667>
- Jennings, N., Lee, G., Chao, K., & Keating, S. (2009). A survey of patient satisfaction in a metropolitan Emergency Department: comparing nurse practitioners and emergency physicians. *International Journal of Nursing Practice*, 15, 213–218. <https://doi.org/10.1111/j.1440-172X.2009.01746.x>
- Jiao, S., Murimi, I. B., Stafford, R. S., Mojtatabi, R., & Alexander, G. C. (2018). Quality of prescribing by physicians, nurse practitioners, and physician assistants in the United States. *Pharmacotherapy*, 38, 417–427. <https://doi.org/10.1002/phar.2095>
- Jones, M. G., DeCherrie, L. V., Meah, Y. S., Hernandez, C. R., Lee, E. J., Skovran, D. M., et al. (2017). Using nurse practitioner co-management to reduce hospitalizations and readmissions within a home-based primary care program. *Journal for Healthcare Quality*, 39, 249–258. <https://doi.org/10.1097/JHQ.0000000000000059>
- Kalne, P. S., & Mehendale, A. M. (2022). The Purpose of Time-Motion Studies (TMSs) in healthcare: a literature review. *Cureus*, 14, Article e29869. <https://doi.org/10.7759/cureus.29869>
- Kapu, A. N., & Kleinpell, R. (2013). Developing nurse practitioner associated metrics for outcomes assessment. *Journal of the American Association of Nurse Practitioners*, 25, 289–296. <https://doi.org/10.1111/1745-7599.12001>
- Kattakuzhy, S., Gross, C., Emmanuel, B., Teferi, G., Jenkins, V., Silk, R., et al. (2017). Expansion of treatment for hepatitis C virus infection by task shifting to community-based nonspecialist providers: a nonrandomized clinical trial. *Annals of Internal Medicine*, 167, 311–318. <https://doi.org/10.7326/M17-0118>
- Kilpatrick, K., Tchouaket, E., Jabbour, M., & Hains, S. (2020). A mixed methods quality improvement study to implement nurse practitioner roles and improve care for residents in long-term care facilities. *BMC Nurs*, 19, Article 6. <https://doi.org/10.1186/s12912-019-0395-2>
- Kingsley, C., & Patel, S. (2017). Patient-reported outcome measures and patient-reported experience measures. *BJA Education*, 17, 137–144. <https://doi.org/10.1093/bjaed/mkw060>
- Kippenbrock, T., Emory, J., Lee, P., Odell, E., Buron, B., & Morrison, B. (2019). A national survey of nurse practitioners' patient satisfaction outcomes. *Nursing Outlook*, 67, 707–712. <https://doi.org/10.1016/j.outlook.2019.04.010>
- Kurtzman, E. T., & Barnow, B. S. (2017). A comparison of nurse practitioners, physician assistants, and primary care physicians' patterns of practice and quality of care in health centers. *Medical Care*, 55, 615–622. <https://doi.org/10.1097/MLR.0000000000000689>
- Laurant, M., van der Biezen, M., Wijers, N., Watananirun, K., Kontopantelis, E., & van Vught, A. J. (2018). Nurses as substitutes for doctors in primary care. *Cochrane Database of Systematic Reviews*, 7, Article CD001271. <https://doi.org/10.1002/14651858.CD001271.pub3>
- Leask, C. F., & Tennant, H. (2019). Evaluation of an unscheduled care model delivered by advanced nurse practitioners in a primary-care setting. *Journal of Research in Nursing*, 24, 696–709. <https://doi.org/10.1177/1744987119852380>
- Lehmann, J., Dragan, T., Rammant, E., de Ligt, K. M., Lai-Kwon, J., Lidington, E., et al. (2025). Exploring the integration of patient-reported outcome measures in clinical practice: a cross-sectional survey of EORTC healthcare professionals. *Eur J Cancer*, 220, Article 115333. <https://doi.org/10.1016/j.ejca.2025.115333>
- Liu, C. F., Hebert, P. L., Douglas, J. H., Neely, E. L., Sulc, C. A., Reddy, A., et al. (2020). Outcomes of primary care delivery by nurse practitioners: utilization, cost, and quality of care. *Health Services Research*, 55, 178–189. <https://doi.org/10.1111/1475-6773.13246>
- Lutfiyya, M. N., Tomai, L., Frogner, B., Cerra, F., Zismer, D., & Parente, S. (2017). Does primary care diabetes management provided to Medicare patients differ between primary care physicians and nurse practitioners? *Journal of Advanced Nursing*, 73, 240–252. <https://doi.org/10.1111/jan.13108>
- Machin, C. (2017). Can a nurse practitioner independently diagnose and manage skin cancer? *Dermatological Nursing*, 16, 10–15. (<https://research.ebsco.com/linkprocessor/plink?id=51aa95ed-f940-3486-a2eb-b3dc559c3ca4>).
- Mahmud, N., Halpern, S., Farrell, R., Ventura, K., Thomasson, A., Lewis, H., et al. (2019). An advanced practice practitioner-based program to reduce 30- and 90-day readmissions after liver transplantation. *Liver Transplantation*, 25, 901–910. <https://doi.org/10.1002/lt.25466>
- Maselli, K. M., Camacho, L., Delaplain, P. T., Nguyen, M. V. L., Mallicote, M., Philippe-Auguste, M., et al. (2021). Nurse practitioner-managed clinic reduces emergency department visits for parents of children with problematic gastrostomy tubes. *Journal of Pediatric Surgical Nursing*, 10, 56–63. <https://doi.org/10.1097/jps.0000000000000286>
- Masters, E., Weston, C., Chisholm, J., & Soanes, L. (2019). Role of the advanced nurse practitioner within teenage and young adult oncology. What is the impact on patient and staff experience of a new nurse practitioner role to a teenage and young adult service? *Journal of Adolescent and Young Adult Oncology*, 8, 668–673. <https://doi.org/10.1089/jayao.2019.0020>
- McDevitt, J., & Melby, V. (2015). An evaluation of the quality of Emergency Nurse Practitioner services for patients presenting with minor injuries to one rural urgent care centre in the UK: a descriptive study. *Journal of Clinical Nursing*, 24, 523–535. <https://doi.org/10.1111/jocn.12639>
- Middleton, S., Gardner, G., Gardner, A., Considine, J., Fitzgerald, G., Christofis, L., et al. (2019). Are service and patient indicators different in the presence or absence of nurse practitioners? The EDRAC cohort study of Australian emergency departments. *BMJ Open*, 9, Article e024529. <https://doi.org/10.1136/bmjopen-2018-024529>
- Montejo, L., Richesson, R., Padilla, B. I., Zychowicz, M. E., & Hambley, C. (2017). Increasing influenza immunization rates among retail employees: an evidence-based approach [comparative study]. *Workplace Health & Safety*, 65, 424–429. <https://doi.org/10.1177/2165079916686591>
- Moreton, S. G., Saurman, E., Salkeld, G., Edwards, J., Hooper, D., Kneen, K., et al. (2020). Economic and clinical outcomes of the nurse practitioner-led Sydney Adventist Hospital Community Palliative Care Service. *Australian Health Review*, 44, 791–798. <https://doi.org/10.1071/ah19247>
- Morgan, P. A., Smith, V. A., Berkowitz, T. S. Z., Edelman, D., Van Houtven, C. H., Woolson, S. L., et al. (2019). Impact of physicians, nurse practitioners, and physician assistants on utilization and costs for complex patients. *Health Affairs*, 38, 1028–1036. <https://doi.org/10.1377/hlthaff.2019.00014>
- Mori, K., Tsukamoto, Y., Makino, S., Takabayashi, T., Kurosawa, M., Ohashi, W., et al. (2022). Effect of intensive care provided by nurse practitioners for postoperative patients: a retrospective observational before-and-after study. *PLoS One*, 17, Article e0262605. <https://doi.org/10.1371/journal.pone.0262605>
- Mountford, J., & Shojania, K. G. (2012). Refocusing quality measurement to best support quality improvement: local ownership of quality measurement by clinicians. *BMJ Quality & Safety*, 21, 519–523. <https://doi.org/10.1136/bmjqs-2012-000859>
- Moussa, G., Ch'ng, S. W., Kalogeropoulos, D., Abdel-Karim, Z., Panthagani, J., & Andreatta, W. (2022). Comparing the outcomes of YAG laser anterior capsulotomies performed by an advanced nurse practitioner to ophthalmologists in the management of anterior capsular contraction syndrome. *Journal of the American Association of Nurse Practitioners*, 34, 1133–1138. <https://doi.org/10.1097/jxx.0000000000000775>
- Mukai, T., Tsutsumi, T., Takaishi, E., Hamada, O., Sasaki, S., Shimokawa, T., et al. (2021). Nurse practitioner's geriatric practice in Japanese postacute care setting. *The Journal for Nurse Practitioners*, 17, 1250–1255. <https://doi.org/10.1016/j.nurpra.2021.08.002>

- Munn, Z., Peters, M. D. J., Stern, C., Tufanaru, C., McArthur, A., & Aromataris, E. (2018). Systematic review or scoping review? Guidance for authors when choosing between a systematic or scoping review approach. *BMC Medical Research Methodology*, 18, Article 143. . <https://doi.org/10.1186/s12874-018-0611-x>
- Nandwani, M., Clarke, J. O., Kurikose, C., & Stevenson, E. (2021). Impact of nurse practitioner navigation on access to care for patients with refractory gastro-esophageal reflux disease. *Journal of the American Association of Nurse Practitioners*, 33, 77–85. <https://doi.org/10.1097/jxx.0000000000000296>
- Nelson, E., Bobade, R., Hunt, V., & Mundi, M. S. (2018). Optimizing adult diabetes care in community health. *Journal of the American Association of Nurse Practitioners*, 30, 443–449. <https://doi.org/10.1097/jxx.000000000000042>
- Nursing and Midwifery Board of Australia (2021). *Nurse Practitioner Standards for Practice*. Available from: (<https://www.nursingmidwiferyboard.gov.au>). [Accessed 10 February 2023].
- O'Reilly-Jacob, M., Perloff, J., & Buerhaus, P. (2019). Comparing the rates of low-value back images ordered by physicians and nurse practitioners for Medicare beneficiaries in primary care. *Nursing Outlook*, 67, 713–724. <https://doi.org/10.1016/j.outlook.2019.05.005>
- O'Toole, K., Chamberlain, D., & Giles, T. (2020). Exploration of a nurse practitioner-led phase two cardiac rehabilitation programme on attendance and compliance [Observational Study]. *Journal of Clinical Nursing*, 29, 785–793. <https://doi.org/10.1111/jocn.15133>
- Oatley, M., & Fry, M. (2020). A nurse practitioner-led model of care improves access, early assessment and integration of oncology services: an evaluation study [Evaluation Study]. *Supportive Care in Cancer*, 28, 5023–5029. <https://doi.org/10.1007/s00520-019-05292-0>
- Oner, B., Zengul, F. D., Oner, N., Ivankova, N. V., Karadag, A., & Patrician, P. A. (2021). Nursing-sensitive indicators for nursing care: a systematic review (1997–2017). *Nursing Open*, 8, 1005–1022. <https://doi.org/10.1002/nop2.654>
- Osakwe, Z. T., Barron, Y., McDonald, M. V., & Feldman, P. H. (2021). Effect of nurse practitioner interventions on hospitalizations in the community transitions intervention trial. *Nursing Research*, 70, 266–272. <https://doi.org/10.1097/NNR.0000000000000508>
- Patel, M. S., Hogshire, L. C., Noveck, H., Steinberg, M. B., Hoover, D. R., Rosenfeld, J., et al. (2021). A retrospective cohort study of the impact of nurse practitioners on hospitalized patient outcomes. *Nursing Reports*, 11, 28–35. <https://doi.org/10.3390/nursrep11010003>
- Peter, E. (2020). Evaluating the impact of nurse practitioner involvement in a pleural procedures clinic. *British Journal of Nursing*, 29, 816–820. <https://doi.org/10.12968/bjon.2020.29.14.816>
- Peters, M., Godfrey, C., McInerney, P., Baldino Soares, C., & Khalil, H. (2020). Scoping reviews. In E. Aromataris, & Z. Munn (Eds.), *JBI Manual for Evidence Synthesis (Vol. 2020 version, pp. 6)*. JBI <https://doi.org/10.46658/JBIMES-20-12>
- Prescott, P. A., & Driscoll, L. (1979). Nurse practitioner effectiveness: a review of physician-nurse comparison studies. *Evaluation & the Health Professions*, 2, 387–418. <https://doi.org/10.1177/1016327877900200401>
- Roche, T. E., Gardner, G., & Jack, L. (2017). The effectiveness of emergency nurse practitioner service in the management of patients presenting to rural hospitals with chest pain: a multisite prospective longitudinal nested cohort study. *BMC Health Services Research*, 17, Article 445. . <https://doi.org/10.1186/s12913-017-2395-9>
- Rodgers, J., Stanton, M., & Jackson, J. (2018). Providing care to COPD patients using in-home visits by nurse practitioners. *Journal of Nursing Care Quality*, 33, 208–212. <https://doi.org/10.1097/ncq.0000000000000295>
- Rose, T., Frith, K., & Zimmer, R. (2021). Transitional care following a skilled nursing facility stay: utilization of nurse practitioners to reduce readmissions in high risk older adults. *Geriatric Nursing*, 42, 1594–1596. <https://doi.org/10.1016/j.gerinurse.2021.06.024>
- Rothwell, S., McIltrout, K., & Khouri-Stevens, Z. (2018). Addressing emergency department issues using advanced practice in Saudi Arabia. *The Journal for Nurse Practitioners*, 14, e41–e44. <https://doi.org/10.1016/j.nurpra.2017.11.006>
- Ruggiero, K., Pratt, P., & Antonelli, R. (2019). Improving outcomes through care coordination: measuring care coordination of nurse practitioners. *Journal of the American Association of Nurse Practitioners*, 31, 476–481. <https://doi.org/10.1097/JXX.0000000000000276>
- Sanko, S., Kashani, S., Ito, T., Guggenheim, A., Fei, S., & Eckstein, M. (2020). Advanced practice providers in the field: implementation of the los angeles fire department advanced provider response unit. *Prehospital Emergency Care*, 24, 693–703. <https://doi.org/10.1080/10903127.2019.1666199>
- Scherzer, R., Dennis, M. P., Swan, B. A., Kavuru, M. S., & Oxman, D. A. (2017). A comparison of usage and outcomes between nurse practitioner and resident-staffed medical ICUs. *Critical Care Medicine*, 45, e132–e137. <https://doi.org/10.1097/CCM.0000000000002055>
- Schlabach, T., King, T. S., Browning, K. K., & Kue, J. (2022). Nurse practitioner-led lung cancer screening clinic: an evidence-based quality improvement evaluation. *Worldviews on Evidence-Based Nursing*, 19, 227–234. <https://doi.org/10.1111/wvn.12578>
- Schuttner, L., Richardson, C., Parikh, T., & Wong, E. S. (2023). "Low-value" glycemic outcomes among older adults with diabetes cared for by primary care nurse practitioners or physicians: a retrospective cohort study. *International Journal of Nursing Studies*, 145, Article 104532. . <https://doi.org/10.1016/j.ijnurstu.2023.104532>
- Shand, W., Klemmer, D., Grubb, S., Chesney, S., Olsen, B., & So, L. (2020). Research to action: nurse practitioners in the emergency department, emergency department transition clinic and intravenous therapy clinic at Strathcona Community Hospital. *Canadian Journal of Emergency Nursing*, 43, Article 5. . <https://doi.org/10.29173/cjen44>
- Sharma, S., Beadle, E., Caton, E., Farrington, K., & Radnor, Z. (2024). The role of patient-reported experience and outcome measures in kidney health equity-oriented quality improvement. *Seminars in Nephrology*, 44, Article 151553. . <https://doi.org/10.1016/j.semnephrol.2024.151553>
- Smits, M., Peters, Y., Ranke, S., Plat, E., Laurant, M., & Giesen, P. (2020). Substitution of general practitioners by nurse practitioners in out-of-hours primary care home visits: a quasi-experimental study. *International Journal of Nursing Studies*, 104, Article 103445. . <https://doi.org/10.1016/j.ijnurstu.2019.103445>
- Smyth, P., Watson, K. E., Al Hamarnah, Y. N., & Tsuyuki, R. T. (2022). The effect of nurse practitioner (NP-led) care on health-related quality of life in people with multiple sclerosis – a randomized trial. *BMC Neurology*, 22, Article 275. . <https://doi.org/10.1186/s12883-022-02809-9>
- Stanley, M., Worrall-Carter, L., Rahman, M. A., McEvedy, S., & Langham, R. (2015). Assessment of an established dialysis nurse practitioner model of care using mixed methods research. *Contemporary Nurse*, 51, 148–162. <https://doi.org/10.1080/10376178.2016.1157029>
- Stefos, T., Moran, E. A., Poe, S. A., & Hooker, R. S. (2022). Assessing the productivity of PAs and NPs. *JAAPA*, 35, 44–50. <https://doi.org/10.1097/01.Jaa.0000885152.52758.48>
- Tchouaket, E., Kilpatrick, K., & Jabbour, M. (2020). Effectiveness for introducing nurse practitioners in six long-term care facilities in Quebec, Canada: a cost-savings analysis [Observational Study]. *Nursing Outlook*, 68, 611–625. <https://doi.org/10.1016/j.outlook.2020.06.002>
- Palmer, W., Julian, S., & Vaughan, L. (2023). *Independent Report on the Regulation of Advanced Practice in Nursing and Midwifery*. Nuffield Trust. Available from: (<https://www.nuffieldtrust.org.uk>). [Accessed 2 February 2024].
- The Organisation for Economic Development (2016). *Definitions for Health Care Quality Indicators 2016–2017 HCQI Data Collection*. The Organisation for Economic Development. Available from: (<https://www.oecd.org/els/health-systems/Definitions-of-Health-Care-Quality-Indicators.pdf>) [Retrieved 30 December].
- Thompson, J. (2020). Entrustable professional activities for nurse practitioner preparation. *Nurse Education Today*, 90, Article 104439. . <https://doi.org/10.1016/j.nedt.2020.104439>
- Tricco, A. C., Lillie, E., Zarin, W., O'Brien, K. K., Colquhoun, H., Levac, D., et al. (2018). PRISMA Extension for Scoping Reviews (PRISMA-ScR): checklist and explanation. *Annals of Internal Medicine*, 169, 467–473. <https://doi.org/10.7326/m18-0850>
- Uranaka, K., Takaira, H., Shinohara, R., & Yamagata, Z. (2021). Comparison of Japan nurse practitioner-led care and physician trainee-led care on patients' length of stay in a secondary emergency department: a retrospective study. *Japan Journal of Nursing Science*, 18, Article e12437. . <https://doi.org/10.1111/jjns.12437>
- van der Zalm, Y. C., Schulte, P. F., Bogers, J., Termorshuizen, F., Marcelis, M., van Piere, M., et al. (2020). Delegating clozapine monitoring to advanced nurse practitioners: an exploratory, randomized study to assess the effect on prescription and its safety. *Administration & Policy in Mental Health*, 47, 632–640. <https://doi.org/10.1007/s10488-020-01031-4>
- van Leendert, J. A. A., Linkens, A., Poeze, M., Pijpers, E., Magdelijns, F., Ten Broeke, R. H. M., et al. (2021). Mortality in hip fracture patients after implementation of a nurse practitioner-led orthogeriatric care program: results of a 1-year follow-up. *Age & Ageing*, 50, 1744–1750. <https://doi.org/10.1093/ageing/afab031>
- van Vugt, S. F., van de Pol, A. C., Cleveringa, F. G. W., Stellato, R. K., Kappers, M. P., de Wit, N. J., et al. (2018). A case study of nurse practitioner care compared with general practitioner care for children with respiratory tract infections. *Journal of Advanced Nursing*, 74(9), 2106–2114. <https://doi.org/10.1111/jan.13712>
- Walling, A. M., D'Ambruoso, S. F., Malin, J. L., Hurvitz, S., Zisser, A., Coscarelli, A., et al. (2017). Effect and efficiency of an embedded palliative care nurse practitioner in an oncology clinic. *Journal of Oncology Practice*, 13, e792–e799. <https://doi.org/10.1200/JOP.2017.020990>
- Wand, T., Collett, G., Cutten, A., Buchanan-Hagen, S., Stack, A., & White, K. (2020). Patient and clinician experiences with an emergency department-based mental health liaison nurse service in a metropolitan setting. *International Journal of Mental Health Nursing*, 29, 1202–1217. <https://doi.org/10.1111/inm.12760>
- Wand, T., Collett, G., Cutten, A., Buchanan-Hagen, S., Stack, A., & White, K. (2021). Patient and staff experience with a new model of emergency department based mental health nursing care implemented in two rural settings. *International Emergency Nursing*, 57, Article 101013. . <https://doi.org/10.1016/j.ienj.2021.101013>
- Wong, I., Wright, E., Santomauro, D., How, R., Leary, C., & Harris, M. (2018). Implementing two nurse practitioner models of service at an Australian male prison: a quality assurance study. *Journal of Clinical Nursing*, 27, e287–e300. <https://doi.org/10.1111/jocn.13935>
- Yang, B. K., Idzik, S., Nelson, H. W., & McSweeney-Feld, M. H. (2023). Nurse practitioner employment in relation to nursing staff turnover and resident care outcomes in US nursing homes. *Journal of the American Medical Directors Association*, 24, 1767–1772. <https://doi.org/10.1016/j.jamda.2023.07.019>