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Barriers and facilitators to the implementation of the advanced nurse practitioner role in primary care settings: A scoping review

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ABSTRACT

Background: Workload and workforce issues in primary care are key drivers for the growing international trend to expand nursing roles. Advanced nurse practitioners are increasingly being appointed to take on activities and roles traditionally carried out by doctors. Successful implementation of any new role within multidisciplinary teams is complex and time-consuming, therefore it is important to understand the factors that may hinder or support implementation of the advanced nurse practitioner role in primary care settings.

Objectives: To identify, appraise and synthesise the barriers and facilitators that impact implementation of advanced practitioner roles in primary care settings.

Methods: A scoping review conducted using the Arksey and O'Malley (2005) framework and reported in accordance with PRISMA-ScR. Eight databases (Cochrane Library, Health Business Elite, Kings Fund Library, HMIC, Medline, CINAHL, SCOPUS and Web of Science) were searched to identify studies published in English between 2002 and 2017. Study selection and methodological assessment were conducted by two independent reviewers. A pre-piloted extraction form was used to extract the following data: study characteristics, context, participants and information describing the advanced nurse practitioner role. Deductive coding for barriers and facilitators was undertaken using a modified Yorkshire Contributory Framework. We used inductive coding for barriers or facilitators that could not be classified using pre-defined codes. Disagreements were addressed through discussion. Descriptive data was tabulated within evidence tables, and key findings for barriers and facilitators were brought together within a narrative synthesis based on the volume of evidence.

Findings: Systematic searching identified 5976 potential records, 2852 abstracts were screened, and 122 full texts were retrieved. Fifty-four studies (reported across 76 publications) met the selection criteria. Half of the studies ($n = 27$) were conducted in North America ($n = 27$), and 25/54 employed a qualitative design. The advanced nurse practitioner role was diverse, working across the lifespan and with different patient groups. However, there was little agreement about the level of autonomy, or what constituted everyday activities. Team factors were the most frequently reported barrier *and* facilitator. Individual factors, lines of responsibility and 'other' factors (i.e., funding), were also frequently reported barriers. Facilitators included individual factors, supervision and leadership and 'other' factors (i.e., funding, planning for role integration).

Conclusion: Building collaborative relationships with other healthcare professionals and negotiating the role are critical to the success of the implementation of the advanced nurse practitioner role. Team consensus about the role and how it integrates into the wider team is also essential.

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What is already known about the topic?

- Primary care is facing a crisis in healthcare provision (in part due to people living longer and/ or with long-term conditions) that must be addressed with creative solutions, including new models of care.
- Advanced Nurse Practitioners already carry out a range of primary care roles, including those traditionally carried out by General Practitioners/ Primary Care Practitioners but support for an advanced role including provision of supervision can be variable.
- Advanced Nurse Practitioners working in primary care have been found to deliver care that is safe, effective and enhances patient experience.
- Current models of Advanced Nurse Practitioners working in primary care exist and support for their roles can vary but little is known about what helps or hinders their integration in services.

What this paper adds

- Stresses the importance of team factors (i.e., how different professionals within a group work (e.g., team culture across professions/ specialities) and collaboration/ relationships) as both the main barrier and facilitator of implementation.
- Leadership and team involvement are imperative to develop and reach consensus on new models of care.
- Provides important information on a framework of support for successful implementation of Advanced Nurse Practitioner roles in primary care. Emphasises the need for clarity about continued support for the Advanced Nurse Practitioner role, as regards to on-going education/training, and establishing General Practitioners/Primary Care Practitioners.

1. Introduction

Global workforce and workload challenges coupled with an ageing patient demographic has placed a premium on services delivered within primary care settings (Baird et al., 2016). Consequently, there is renewed international interest in reviewing and re-defining the roles of all frontline professionals in order to meet some of the workforce shortages. Nurses are arguably best placed to provide this flexible and responsive healthcare, as they constitute one of the largest group of professionals delivering frontline care (SG., 2017).

Expanding the scope of nursing is not a new solution. The advanced nursing role was introduced in the early 1960s, in the USA, to alleviate some of the workforce challenges (Sheer and Wong, 2008). Subsequently, this advanced role has continued to develop globally, albeit at different rates often arising from the perceived need to increase the number of practitioners in areas under-resourced and under-served by doctors (Carnwell and Daly, 2003).

The Advanced Nurse Practitioner (ANP) is a generic term for a number of different extended nursing roles, typically carried out by nurses with experience and qualifications beyond their bachelors' degree. However, advanced nursing titles are diverse and a variety exist including, nurse practitioner (NP), advanced practice nurse (APN), clinical nurse specialist (CNS), nurse specialist, professional nurse, expert nurse, nurse consultant (Baird et al., 2016) and advanced clinical practitioner (ACP) (HEE, 2017), making recognition of roles, scope of practice and the regulation surrounding these, challenging. In keeping with the International Council of Nurses (ICN) definition of Nurse Practitioner/Advance Practice Nursing (ICN, 2018), and the Royal College of Nurses (RCN) definition of Advanced Nurse Practitioner (RCN, 2018) as well as earlier reviews in this field (Sangster-Gormley et al., 2011), for ease of reading we will use the term Advanced Nurse Practitioner to refer to the various advanced level nursing titles. This avoids confusion with Practice Nurses in the UK health services, who carry out a different role and are not qualified at an advanced level, and also recognises the advanced role as defined within the UK context.

The International Council of Nurses (ICN), has defined the advanced role as a

> "registered nurse who has acquired the expert knowledge base, complex decision-making skills and clinical competencies for expanded practice, the characteristics of which are shaped by the context and/or country in which s/he is credentialed to practice. A master's degree is recommended for entry level." (ICN, 2018) (p.7).

Advanced nurses working at this level are expected to demonstrate expertise in four areas: clinical practice, leadership and management, education and research (HEE, 2017). This also includes working autonomously, using professional judgement, working collaboratively across professions and agencies in addition to monitoring risk and evaluating outcomes (CNOD, 2017; DoH, 2010).

Review evidence has demonstrated that Advanced Nurse Practitioners can have similar outcomes for patients when substituting for doctors in primary care (Laurant et al., 2018). These results also suggest that patients in primary care may be more satisfied with health care provided by nurses working in extended roles (Horrock et al., 2002; Laurant et al., 2018).

Despite the potential benefits of increasing the availability of the Advanced Nurse Practitioner role, we still have limited insight about the actual scope of practice, or how the role is currently implemented within primary care settings. A recent review (Faraz, 2016) provided evidence for barriers and facilitators in relation to the transition of newly qualified or novice Advanced Nurse Practitioners into primary care. The authors identified several themes including "experiencing role ambiguity," "quality of professional and interpersonal relationships," and "facing intrinsic and extrinsic obstacles", within this initial experience of transition into a first primary care role (Faraz, 2016). A second review considered implementation of the Advanced Nurse Practitioner role across healthcare settings in Canada (Sangster-Gormley et al., 2011). Reviewers described barriers to Advanced Nurse Practitioner implementation at the systems, organisational and practice setting levels, specifying problems within legislation, role ambiguity and autonomy and resistance to the role. Prior planning as well as stakeholder understanding of, and support for the role were considered influential in Advanced Nurse Practitioner implementation. To further understand the process of implementation three overarching concepts were also developed. These included involvement (active participation in the early stage of role implementation); acceptance (recognition of the role and willingness to work with the Advanced Nurse Practitioner) and intention (defining and clarifying the Advanced Nurse Practitioner role).

To comprehensively understand the obstacles to, and facilitators of, implementation of the Advanced Nurse Practitioner role in primary care it is essential to identify contributing factors for all Advanced Nurse Practitioners irrespective of their length of service and experience, in addition to considering implementation from an international perspective. It is also crucial to recognise the characteristics of implementation specific to primary care so these can be understood and addressed in future service changes.

In 2016, the Scottish Government commissioned a scoping review of international literature to identify, appraise and synthesise the barriers and facilitators that affect the implementation of advanced practitioner roles in primary care settings.

2. Methods

2.1. Study design

A scoping review was conducted using the methodological steps outlined in Arksey and O'Malley (2005) and reported in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses statement for reporting scoping reviews (PRISMA-ScR) (Tricco et al., 2018). A protocol was developed which documented key definitions, eligibility criteria, and the agreed approach to conducting the review at each stage, based on a series of review team meetings (Supplementary File 1).

2.2. Definition of key terms

The following definitions were used to support the application of the selection criteria:

The International Council of Nurses (ICN) definition of a Nurse Practitioner/ Advanced Practice Nurse (see introduction) was adopted (ICN, 2018).

Primary care was defined as follows:

> *"Primary care provides access to care at the right time when it is required and secures on going care in the community and continuity of relationships, where this is important. In addition to General practices, primary care services covers: community services – including: district and community nursing, mental health and dental services, community pharmacies, optometrists – and for effective health and social care integration - social care services, third and independent sector provision"* (Richie, 2015, p10).

2.3. Information sources and search strategy

We systematically searched the following electronic databases:

- Cochrane Library
- CINAHL (EBSCO)
- Health Business Elite (EBSCO)
- Kings Fund Library
- Healthcare Management Information Consortium (Ovid)
- Medline (Ovid)
- SCOPUS
- Web of Science

A comprehensive search strategy was developed by an information specialist (RP) which combined key terms using a series of free text terms and MESH terms for Advanced Practice Nursing AND Primary Care. Boolean operators, and appropriate "wild cards" were used to account for plurals, and variations in databases and spelling. An example search string is shown in Supplementary File 2.

Searches were limited to English language only publications and only studies published from 1st January 2002 to 7th July 2017 were included. The review team selected this date limitation due to changes in health policy and nursing in the early 2000s, for example in 2002 the International Council of Nurses (ICN, 2002) first published a statement defining the Advanced Nurse Practitioner role and its characteristics. Consequently, papers published prior to 2002 were no longer considered relevant to our research question.

The reference lists of all included studies were checked. We did not conduct any supplementary hand searching of journals due to resource and time constraints.

2.4. Eligibility criteria

An iterative team approach was employed to reach consensus on how best to define the Advanced Nurse Practitioner role within this review. Following the consensus discussions, the following populations of nurses working in general practice and in other primary care settings were included:

- nurse practitioners (NPs),
- advanced practice nurses (APNs),
- advanced nurse practitioners (ANPs),
- advanced district nurses,
- advanced community nurses.

We excluded studies of other types of nurses working in primary care settings e.g., clinical nurse specialists, midwives, health visitors. We also excluded studies where it was not possible to clearly judge the population involved (i.e., where the professional group were not clearly described or involved mixed participants).

We included quantitative and qualitative literature. Studies had to be full texts and published in a peer-reviewed journal. We included all studies that met with our study design criteria and reported barriers and/or facilitators to the implementation of the Advanced Nurse Practitioner role in primary care settings. Studies conducted in mixed settings i.e., primary and secondary care, were only included if the results related to primary care could clearly be identified from the overall findings. Studies in which the Advanced Nurse Practitioner role was reported and which involved the delivery of care or interventions delivered solely in other settings (e.g., secondary care, out of hours or telephone health services including NHS 24) were excluded. Details of the selection criteria are shown in Supplementary File 3.

2.5. Study selection

Two review authors (HB, HS) independently screened titles of the identified references and eliminated any obviously irrelevant studies. One reviewer (MC) screened all of the abstracts ranking them as relevant, irrelevant or unsure. A second reviewer (HS) double screened a random sample of 10% of the abstracts to ensure consistent application of the eligibility criteria. The full text of the remaining studies was obtained and screened independently by two review authors (CT, MC) with a third (PC) resolving any disputes. Studies ranked as irrelevant by both reviewers were excluded.

2.6. Charting the data

2.6.1. Data extraction

A standardised, pre-piloted form was used to extract data from the included studies for assessment of study quality and evidence synthesis.

The following information was extracted:

- study characteristics (author, date of publication, country, aims, study design);
- study population;
- participant demographics;
- study setting;
- description of the Advanced Nurse Practitioner role, (e.g., education and training, length of time in role, any role development);
- details about any interventions delivered to or delivered by the Advanced Nurse Practitioner were profiled using TIDieR reporting guidelines (Hoffmann et al., 2014). These were developed to improve the quality of reporting interventions. Specifically, we extracted the following data using the headings: why, what, how, where when and how much, tailoring, modifications and how well an intervention was delivered (see Supplementary File 4 for a full description of checklist items);
- outcomes and outcome measures;

Table 1
Definitions of the predefined categories based on modified Lawton 2012 framework (Lawton et al., 2012).

Categories	Definition
Active failures	Any failure in performance or behaviour (e.g., error, mistake, violation) of the person at the sharp-end (the health professional) that could affect implementation.
Communication systems	Effectiveness of the processes and systems in place for the exchange and sharing of information between staff, patients, groups, departments and services. This includes both written (e.g., documentation), verbal (e.g., handover) and electronic (e.g., pager, email) communication systems
Design of equipment and supplies	The design of equipment and supplies to overcome physical and performance limitations
Equipment and supplies	Availability and functioning of equipment and supplies
External policy context	Nationally driven policies/directives that impact on the level and quality of resources available to hospitals
Individual factors	Characteristics of the person delivering care that may contribute in some way to active failures or providing effective care. Examples of such factors include inexperience, stress, personality, attitudes
Lines of responsibility	Existence of clear lines of responsibility clarifying accountability of staff members and delineating the job role. Staff members have clear understanding of roles and responsibilities
Management of staff and staffing levels	The appropriate management and allocation of staff to ensure adequate skill mix and staffing levels for the volume of work
Patient factors	Those features of the patient that make caring for them more difficult and therefore may impact implementation. These might include abnormal physiology, language difficulties, personality characteristics, attitudes, preferences (e.g., aggressive attitude)
Physical environment	Features of the physical environment that help or hinder implementation. This refers to the layout of the services, a rural or urban setting, the fixtures and fittings and the level of noise, lighting, temperature etc.
Policy and procedures	The existence of formal and written guidance for the appropriate conduct of work tasks and processes. This can also include situations where procedures are available but contradictory, incomprehensible or of otherwise poor quality
Quality and safety culture	Organisational values, beliefs, and practices surrounding delivering safe and quality care and having the systems and structures in place to evaluate quality and manage safety.
Scheduling and bed management	Adequate scheduling to manage patient appointments and throughput minimising delays and excessive workload
Staff workload	Level of activity and pressures on time
Supervision and leadership	The availability and quality of direct and local supervision and leadership
Support from central functions	Availability and adequacy of central services to support the functioning of wards/ units etc. This might include support for IT, HR, estates and other clinically relevant services (e.g., pharmacy)
Task characteristics	Factors relating to specific patient related tasks which may make individuals vulnerable to error or enhance quality of care (e.g., providing care to complex patients in challenging environments)
Team factors	Any factor related to the working of different professionals within a group which they may be able to change to improve communication or safety (e.g., team culture across professions/ specialities) and collaboration/ relationships.
Training and education	Access to correct, timely and appropriate training both specific (e.g., task related) and general (e.g., organisation related)

- key findings including the barriers and facilitators of implementation.

One review author extracted the data (CT), and this was cross-checked by another member of the review team (GH, HB, HS, MC, MW, PC). Any ambiguity identified was resolved through discussion with other members of the review team. Missing data was requested from study authors ($n=2$) (Petersen and Wray, 2012; Poghosyan et al., 2015).

2.6.2. Data coding

To chart the data we took both a deductive and inductive thematic approach to identifying and coding contributing factors (see below) (Levac et al., 2010). The deductive approach used a modified predefined list of nineteen factors based on the Yorkshire contributory framework reported in Lawton et al. (2012) each of the 19 factors are defined in Table 1. The Yorkshire framework was originally designed to identify contributory factors in patient safety incidences. We determined that the multi-level approach described within the framework, in particular the influence of the individual, systems, organisations and external factors as well as the application in healthcare were particularly pertinent to our study. This multi-level approach was also reflective of the findings from the previous review of implementation of the Advanced Nurse Practitioner role by Sangster-Gormley et al. (2011).

One reviewer (CT) extracted barriers and/or facilitators primarily collected from the results section of each paper. However, additional data were sometimes found in other sections of the paper, and these were extracted when relevant, if clearly supported data were also reported. Data (author, year, country, direct quotes, page numbers) were entered into an excel file and initially coded as either a barrier or a facilitator. Each barrier or facilitator was then coded according to the predefined categories (Table 1) and subthemes were developed. A second reviewer (PC) then independently cross-checked the data. Disagreements were resolved through a combination of discussion and consensus meetings.

Data that did not clearly fit the predefined categories, were coded as 'other'. Inductive coding was used to develop themes (and subthemes) from these data. Through a discursive process, two reviewers thematically analysed this data in the 'other' category, refining and finalising key themes and subthemes.

2.7. Assessment of methodological quality

Scoping reviews do not typically assess methodological quality however, the review team made the decision to include this when developing the protocol to highlight any potential variation in quality across studies. All studies that met the selection criteria were included in subsequent analysis, regardless of methodological quality. Methodological quality was judged using the Mixed Methods Appraisal Tool (MMAT) (Pace et al., 2012; Pluye et al., 2009) and the Critical Appraisal Skills Programme (CASP) tool (CASP, 2018). As multiple tools were employed we presented the qualitative assessment in a descriptive format.

The MMAT tool allows for appraisal of the methodological quality for three methodological domains: (a) qualitative, (b) quantitative and (c) mixed method study designs

(a) Qualitative studies are judged against four criteria: data sources, data analysis process, relationship of findings to context and the potential for researchers' influence in the research findings.

(b) Quantitative studies are subdivided into three subdomains: descriptive, non-randomized and randomised controlled:
- Descriptive studies are assessed against four criteria: sampling strategy, population representativeness, appropriateness of measurements and acceptability or response rate (60% or above)
- Non-randomised studies are assessed against four criteria: selection bias, appropriate use of measurements regarding exposure/ intervention and outcomes, were groups comparable, completeness outcome data (defined as 80% or above) and acceptability of response rate (60% or above) or follow-up rate for cohort studies
- Randomised controlled studies are assessed against four criteria: appropriate sequence generation, allocation concealment, completeness of outcome data (defined as 80% or above), withdrawal/ drop-out rates (below 20%)

(c) Mixed studies use a combination of the qualitative and quantitative descriptive questions reported above. They also include specific questions concerning the appropriateness of the mixed methods design namely: relevance of the mixed methods design, the relevance of integrating the qualitative and quantitative data and whether appropriate consideration has been given to the limitations associated with integration.

The CASP checklist (CASP, 2018) for systematic reviews was also used. This tool appraises review studies using ten questions across three broad areas: the validity of the study, the results of the study and whether the results help locally.

One review author (CT) independently assessed the quality of included studies. Study quality was cross-checked by another member of the review team (GH, HS, MW, MC). Disagreements between authors were resolved by discussion, with involvement of a third review author (PC) where necessary.

2.7.1. Data synthesis

Descriptive data from individual studies was brought together, as were the barriers and facilitators identified, and tabulated within evidence tables (Supplementary files 6, 12–13. Key findings were brought together within a narrative synthesis and described in a series of graphs to illustrate the volume of evidence of barriers and facilitators (Figs. 2 and 3), and highlight the geographical similarities and differences of implementation in primary care (Fig. 4(a) and (b)).

Barriers and facilitators data were organised into one of three groups, based on the volume of reporting:

- Substantial: barriers or facilitators reported in 20 or more studies.
- Moderate: barriers or facilitators reported in 10 −19 studies.
- Low: barriers or facilitators reported in < 10 studies.

3. Results

3.1. Study selection

The systematic search identified 5976 records, 2852 abstracts were screened, and 122 full texts were retrieved. Fifty-four studies (reported across 76 publications) met the inclusion criteria (Altersved et al., 2011; Athey et al., 2016; Bailey et al., 2006; Burgess and Sawchenko, 2011; Cant et al., 2011; Carr et al., 2002; Carryer and Adams, 2017; Carryer et al., 2011; Choi and De Gagne, 2016; Contandriopoulos et al., 2015, de Guzman et al., 2010, DiCenso et al., 2010, Donelan et al., 2013, Faraz, 2017, Faraz, 2016, Fletcher et al., 2011, Gould et al., 2007, Hansen-Turton et al., 2013, Heale et al., 2016, Jakimowicz et al., 2017, Jarrell, 2016, Kraus and DuBois, 2017, Kuo et al., 2013, Lindblad et al., 2010, Ljungbeck and Sjogren Forss, 2017, MacDonald, 2005, Mackay, 2003, Maier and Aiken, 2016, Main et al., 2007, Martin-Misener et al., 2010, McKenna et al., 2015, Nasaif, 2012, Parker et al., 2014, Perry et al., 2005, Petersen and Wray, 2012, Pittman et al., 2016, Poghosyan et al., 2015, Price and Williams, 2003, Rashid, 2010, Rigolosi and Salmond, 2014, Sangster-Gormley et al., 2015, Schadewaldt et al., 2016, Schadewaldt et al., 2013, Spetz et al., 2017, Street and Cossman, 2010, Sullivan-Bentz et al., 2010, Van Soeren et al., 2011, Weiland, 2015, Wilson et al., 2002, Wilson et al., 2005, Xue et al., 2016, Zapatka et al., 2014, Zug et al., 2016). Where there were multiple publications reporting overlapping data related to the same study these were counted as one study and linked to one reference. This included:

- two additional publications (Burgess et al., 2011; Burgess and Purkis, 2010) linked to Burgess and Sawchenko (2011)
- one publication (Plager and Conger, 2006) linked to Conger and Plager (2008)
- five additional publications (Carter et al., 2010; DiCenso et al., 2010; Donald et al., 2010; Kaasalainen et al., 2010) Martin-Misener, 2010) linked to DiCenso et al. (2010)
- one publication (Fletcher et al., 2007) linked to Fletcher et al. (2011)
- two additional publications (Hansen-Turton et al., 2006, 2008) linked to Hansen-Turton et al. (2013)
- one publication Parker et al. (2013) linked to Parker et al. (2014)
- two additional publications (Petersen et al., 2015; Petersen and Way, 2017) linked to Petersen and Wray (2012)
- eight additional publications (Poghosyan and Aiken, 2015; Poghosyan et al., 2016; Poghosyan and Liu, 2016; Poghosyan et al., 2017a, 2013a, 2013b, 2017b, 2017c) linked to Poghosyan et al. (2015).

The flow of literature through the study is shown in Fig. 1.

3.2. Description of included studies

Studies employed a qualitative design ($n = 25$) (Bailey et al., 2006; Burgess and Sawchenko, 2011; Cant et al., 2011; Carryer and Adams, 2017; Carryer et al., 2011; Conger and Plager, 2008; de Guzman et al., 2010; Gould et al., 2007; Heale et al., 2016; Kraus and DuBois, 2017; Lindblad et al., 2010; Ljungbeck and Sjogren Forss, 2017; MacDonald, 2005; Main et al., 2007; McKenna et al., 2015; Perry et al., 2005; Pittman et al., 2016; Price and Williams, 2003; Rigolosi and Salmond, 2014; Sullivan-Bentz et al., 2010; Weiland, 2015; Wilson et al., 2002; Zapatka et al., 2014), and also included literature reviews ($n = 7$) (Choi and De Gagne, 2016; DiCenso et al., 2010; Faraz, 2016; Jakimowicz et al., 2017; Rashid, 2010; Schadewaldt et al., 2013; Xue et al., 2016), mixed methods studies ($n = 4$) (Martin-Misener et al., 2010; Parker et al., 2013; Sangster-Gormley et al., 2015; Schadewaldt et al., 2016), quantitative descriptive studies ($n = 1$) (Jarrell, 2016), and quantitative non-randomised studies ($n = 17$) (Altersved et al., 2011; Athey et al., 2016; Carr et al., 2002; Donelan et al., 2013; Faraz, 2017; Fletcher et al., 2011; Hansen-Turton et al., 2013; Kuo et al., 2013; Mackay, 2003; Maier and Aiken, 2016; Nasaif, 2012; Petersen and Wray, 2012; Poghosyan et al., 2015; Spetz et al., 2017; Street and Cossman, 2010; Van Soeren et al., 2011; Zug et al., 2016).

Studies were conducted across 6 of the 7 continents, only Africa had no aggregated data (Fig. 4). One study did not report the country (Choi and De Gagne, 2016). Most studies were conducted in the USA (33%) (Athey et al., 2016; Conger and Plager, 2008; Donelan et al., 2013; Faraz, 2017; Fletcher et al., 2011; Hansen-Turton et al., 2013; Jarrell, 2016; Kraus and DuBois, 2017; Kuo et al., 2013; Petersen and Wray, 2012; Pittman et al., 2016; Poghosyan et al., 2015; Rigolosi and Salmond, 2014; Spetz et al., 2017; Street and Cossman, 2010; Weiland, 2015; Xue et al., 2016; Zapatka et al., 2014), Canada (19%) (Bailey et al., 2006; Burgess

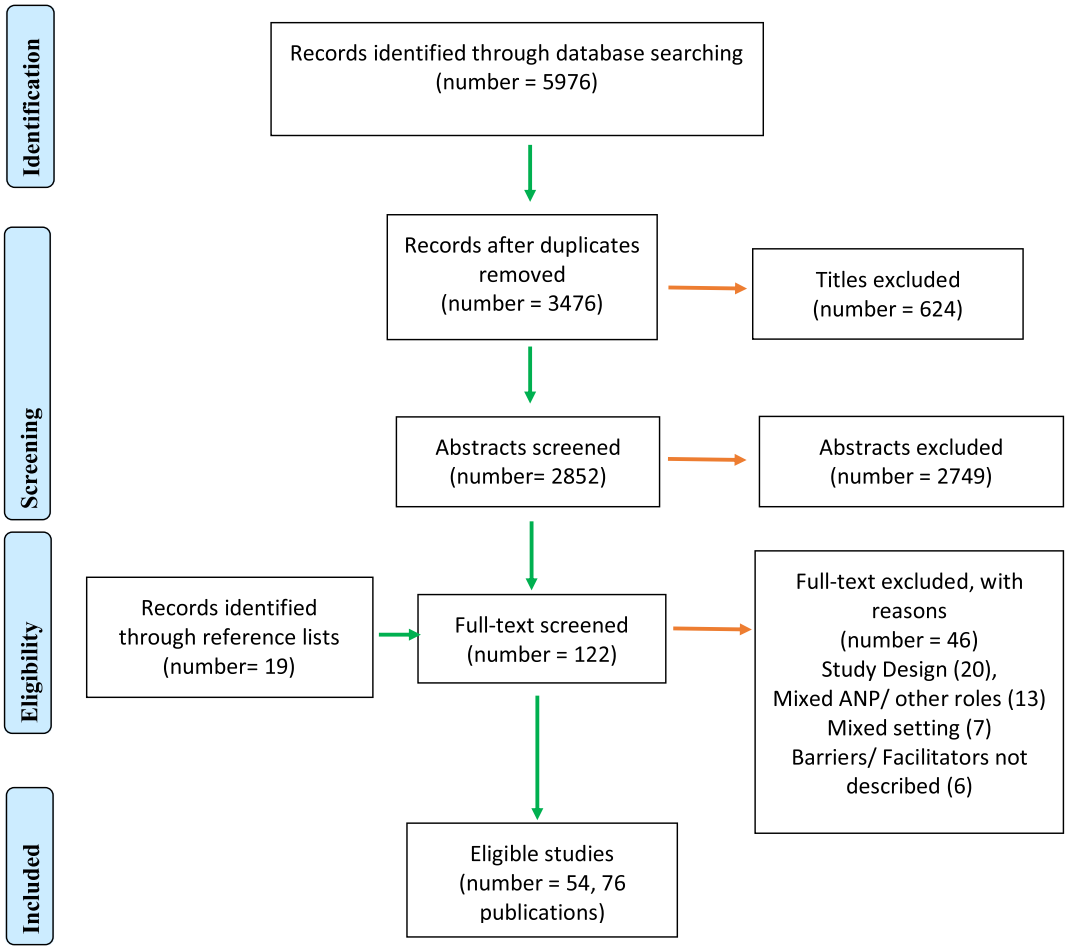

Fig. 1. PRISMA diagram.

and Sawchenko, 2011; Contandriopoulos et al., 2015; de Guzman et al., 2010; DiCenso et al., 2010; Gould et al., 2007; Heale et al., 2016; Martin-Misener et al., 2010; Sangster-Gormley et al., 2015; Sullivan-Bentz et al., 2010; Van Soeren et al., 2011) and the UK (13%) (Carr et al., 2002; MacDonald, 2005; Main et al., 2007; Perry et al., 2005; Price and Williams, 2003; Rashid, 2010; Wilson et al., 2002). Others were conducted in Australia (Cant et al., 2011; McKenna et al., 2015; Parker et al., 2013; Schadewaldt et al., 2016; Wilson et al., 2005), Bahrain (Nasaif, 2012), New Zealand (Carryer and Adams, 2017; Carryer et al., 2011; Mackay, 2003) and Sweden (Altersved et al., 2011; Lindblad et al., 2010; Ljungbeck and Sjogren Forss, 2017) and 4 were carried out across multiple countries (Faraz, 2016; Jakimowicz et al., 2017; Maier and Aiken, 2016; Schadewaldt et al., 2013). (See Supplementary File 5 for a summary of studies by geographical location).

Participants comprised of Advanced Nurse Practitioners, medical professionals including General Practitioners, Primary Care Practitioners, Family Practitioners, Registered Nurses, managers, nurse leaders (e.g., working in education or policy, head of nursing organisations), health leaders (e.g., Chief Executive Officers of community health centres, chairpersons of health boards) health and social care professionals, administrators and patients.

The included studies focused on experiences of the Advanced Nurse Practitioner role from the perspective of healthcare professionals (including Advanced Nurse Practitioners and doctors) and patients; identifying factors influencing implementation of the advanced practice role; defining the Advanced Nurse Practitioner role; and governmental policy in relation to the Advanced Nurse Practitioner role including regulation, reimbursement and workforce management (Supplementary File 6 for details of the study aims).

3.3. Methodological quality

Multiple methodological assessment tools were used to judge study quality. Judgements are presented in supplementary files 7–11. In the following sections, methodological quality is summarised narratively based on study design.

Qualitative studies ($n = 25$) (Bailey et al., 2006; Burgess and Sawchenko, 2011; Cant et al., 2011; Carryer and Adams, 2017; Carryer et al., 2011; Conger and Plager, 2008; Contandriopoulos et al., 2015; de Guzman et al., 2010; Gould et al., 2007; Heale et al., 2016; Kraus and DuBois, 2017; Lindblad et al., 2010; Ljungbeck and Sjogren Forss, 2017; MacDonald, 2005; Main et al., 2007; McKenna et al., 2015; Perry et al., 2005; Pittman et al., 2016; Price and Williams, 2003; Rigolosi and Salmond, 2014; Sullivan-Bentz et al., 2010; Weiland, 2015; Wilson et al., 2002; Wilson et al., 2005; Zapatka et al., 2014).

All studies were judged to have used appropriate data analysis techniques and 23/25 studies adequately reported their data sources (Bailey et al., 2006; Burgess and Sawchenko, 2011; Cant et al., 2011; Carryer and Adams, 2017; Carryer et al., 2011; Conger and Plager, 2008; Contandriopoulos et al., 2015; de Guzman et al., 2010; Heale et al., 2016; Kraus and DuBois, 2017; Ljungbeck and Sjogren Forss, 2017; MacDonald, 2005; Main et al., 2007;

McKenna et al., 2015; Perry et al., 2005; Pittman et al., 2016; Price and Williams, 2003; Rigolosi and Salmond, 2014; Sullivan-Bentz et al., 2010; Weiland, 2015; Wilson et al., 2002; Wilson et al., 2005; Zapatka et al., 2014). Thirteen studies were judged to have considered the findings in relation to context (Bailey et al., 2006; Burgess and Sawchenko, 2011; Conger and Plager, 2008; Contandriopoulos et al., 2015; Heale et al., 2016; Kraus and DuBois, 2017; Ljungbeck and Sjogren Forss, 2017; MacDonald, 2005; Main et al., 2007; McKenna et al., 2015; Pittman et al., 2016; Wilson et al., 2002, 2005), and 6/25 reported details about researcher reflexivity (Kraus and DuBois, 2017; MacDonald, 2005; Perry et al., 2005; Price and Williams, 2003; Weiland, 2015) (Supplementary file 7).

Quantitative non-randomised studies ($n = 17$) (Altersved et al., 2011; Athey et al., 2016; Carr et al., 2002; Donelan et al., 2013; Faraz, 2017; Fletcher et al., 2011; Hansen-Turton et al., 2013; Kuo et al., 2013; Mackay, 2003; Maier and Aiken, 2016; Nasaif, 2012; Petersen and Wray, 2012; Poghosyan et al., 2015; Spetz et al., 2017; Street and Cossman, 2010; Van Soeren et al., 2011; Zug et al., 2016)

Ten studies were judged as low risk for selection bias (Altersved et al., 2011; Athey et al., 2016; Carr et al., 2002; Donelan et al., 2013; Faraz, 2017; Petersen and Wray, 2012; Poghosyan et al., 2015; Spetz et al., 2017; Street and Cossman, 2010; Van Soeren et al., 2011), 13/17 had comparable groups (Altersved et al., 2011; Athey et al., 2016; Carr et al., 2002; Donelan et al., 2013; Faraz, 2017; Fletcher et al., 2011; Kuo et al., 2013; Nasaif, 2012; Petersen and Wray, 2012; Poghosyan et al., 2015; Spetz et al., 2017; Street and Cossman, 2010; Van Soeren et al., 2011) and 10/17 reported an acceptable response rate (60% or above) (Altersved et al., 2011; Athey et al., 2016; Donelan et al., 2013; Faraz, 2017; Fletcher et al., 2011; Kuo et al., 2013; Maier and Aiken, 2016; Nasaif, 2012; Spetz et al., 2017; Van Soeren et al., 2011). Less than half of studies (8/17) included appropriate measurements (Altersved et al., 2011; Donelan et al., 2013; Faraz, 2017; Mackay, 2003; Nasaif, 2012; Petersen and Wray, 2012; Poghosyan et al., 2015; Van Soeren et al., 2011) (Supplementary file 8).

Quantitative descriptive studies ($n = 1$) (Jarrell, 2016)

One study was categorised as a descriptive (quantitative) study (Jarrell, 2016). Methodological judgements for this study are shown in Supplementary file 9. This study was judged as employing a relevant sampling strategy and appeared to have used appropriate measurements. However, reviewers judged that the sample was not regarded to be representative of the population and the response rate (60% or above) was not appropriate (7.37%) (Jarrell, 2016).

Literature reviews ($n = 7$) (Choi and De Gagne, 2016; DiCenso et al., 2010; Faraz, 2016; Jakimowicz et al., 2017; Rashid, 2010; Schadewaldt et al., 2013; Xue et al., 2016)

The methodological quality for literature reviews was variable and no studies met all of the 10 criteria used in the CASP tool. All included studies had a clearly focused question with 6/7 reviews including the right type of papers (Choi and De Gagne, 2016; DiCenso et al., 2010; Jakimowicz et al., 2017; Rashid, 2010; Schadewaldt et al., 2013; Xue et al., 2016). Three studies were considered to have included all relevant studies (DiCenso et al., 2010; Rashid, 2010; Schadewaldt et al., 2013) and 4/7 conducted methodological quality assessment (Choi and De Gagne, 2016; Jakimowicz et al., 2017; Rashid, 2010; Schadewaldt et al., 2013). Review authors judged that 4/7 reviews had adequately combined their results (Faraz, 2016; Rashid, 2010; Schadewaldt et al., 2013; Xue et al., 2016), and the overall results were clear in 6/7 studies (Choi and De Gagne, 2016; DiCenso et al., 2010; Faraz, 2016; Jakimowicz et al., 2017; Schadewaldt et al., 2013; Xue et al., 2016). The precision of results could not be determined as narrative syntheses were carried out in each study and we were unable to judge whether the benefits outweighed the costs. Three reviews were considered applicable to the local population (Jakimowicz et al., 2017; Rashid, 2010; Schadewaldt et al., 2013) and 6/7 reviews considered all of the important outcomes (Choi and De Gagne, 2016; DiCenso et al., 2010; Faraz, 2016; Jakimowicz et al., 2017; Schadewaldt et al., 2013; Xue et al., 2016) (Supplementary file 10).

Mixed methods studies ($n = 4$) (Martin-Misener et al., 2010; Parker et al., 2013; Sangster-Gormley et al., 2015; Schadewaldt et al., 2016)

Qualitative criteria: All of the studies were judged to have adequately considered the relevance of the data source and the data analysis process. Only two studies considered the findings in relation to context (Martin-Misener et al., 2010; Schadewaldt et al., 2016). None of the studies considered researcher reflexivity.

Quantitative criteria: One study was judged as having a relevant sampling strategy (Martin-Misener et al., 2010); the remaining three studies were unclear. One study met the criteria for a representative population (Schadewaldt et al., 2016). Two studies appeared to have employed appropriate measurements (Martin-Misener et al., 2010; Schadewaldt et al., 2016). None of the studies had an acceptable response rate (≥60%). Three studies were considered to have used the appropriate research design to answer (Martin-Misener et al., 2010; Sangster-Gormley et al., 2011; Schadewaldt et al., 2016). Reviewers judged that two studies had also adequately integrated the quantitative and qualitative methods (Sangster-Gormley et al., 2011; Schadewaldt et al., 2016), with only one study considering the limitations of their study design (Schadewaldt et al., 2016) (Supplementary file 11).

3.4. The role of the advanced nurse practitioner

Nurse Practitioner was the main title used for nurses working in an advanced role, across studies, ($n = 45$) this included titles such as Primary Healthcare Nurse Practitioner (PHCNP) ($n = 2$), Family Nurse Practitioner (FNP) ($n = 1$) and Nurse Practitioner Fellow ($n = 1$). Other titles reported were Advanced Practice Nurse (APN) ($n = 6$), Specialist Nurse ($n = 1$) other mixed advanced roles were also reported ($n = 2$). When reported the majority of Advanced Nurse Practitioners were female (Altersved et al., 2011; Athey et al., 2016; Bailey et al., 2006; Cant et al., 2011; Carryer and Adams, 2017; de Guzman et al., 2010; Donelan et al., 2013; Faraz, 2017; Fletcher et al., 2011; Gould et al., 2007; Kraus and DuBois, 2017; Petersen and Wray, 2012; Poghosyan et al., 2015; Spetz et al., 2017) and were between approximately 25 and 60 years old (Supplementary File 6).

Eighteen studies (Altersved et al., 2011; Burgess and Sawchenko, 2011; Carryer and Adams, 2017; Contandriopoulos et al., 2015; DiCenso et al., 2010; Gould et al., 2007; Kraus and DuBois, 2017; Kuo et al., 2013; Ljungbeck and Sjogren Forss, 2017; Maier and Aiken, 2016; Main et al., 2007; Parker et al., 2013; Pittman et al., 2016; Poghosyan et al., 2015; Rigolosi and Salmond, 2014; Schadewaldt et al., 2016; Van Soeren et al., 2011; Xue et al., 2016) specifically referred to the introduction of legislation as determining the Advanced Nurse Practitioner role and scope of practice. Advanced Nurse Practitioners' legal authority varied between countries. For example, in Sweden Advanced Nurse Practitioners were legislated to independently diagnose but this was limited to uncomplicated infectious diseases and they were unable to prescribe on the basis of their diagnosis (Altersved et al., 2011; Contandriopoulos et al., 2015). In Canada, Advanced Nurse Practitioners had legal and regulatory authority to diagnose and prescribe, alongside other activities, however this had to be done in collaboration with doctors (Contandriopoulos et al., 2015). Collaborative practice agreements were also a legal requirement in many parts of the USA (Kraus and DuBois, 2017; Poghosyan et al., 2015) and in Australia (Schadewaldt et al., 2016).

The Advanced Nurse Practitioner role was diverse with nurses working directly with patients with both acute and chronic

conditions in primary care. The scope of the Advanced Nurse Practitioner role was varied and most frequently included:

- assessment (Cant et al., 2011; Carryer and Adams, 2017; Fletcher et al., 2011; Maier and Aiken, 2016; Martin-Misener et al., 2010; Van Soeren et al., 2011),
- diagnosis (Carryer and Adams, 2017; DiCenso et al., 2010; Maier and Aiken, 2016; Martin-Misener et al., 2010; Poghosyan et al., 2015; Sangster-Gormley et al., 2015; Schadewaldt et al., 2013),
- prescribing (Cant et al., 2011; Hansen-Turton et al., 2013; Maier and Aiken, 2016; Martin-Misener et al., 2010; Sangster-Gormley et al., 2015; Xue et al., 2016),
- ordering tests (Carryer and Adams, 2017; DiCenso et al., 2010; Maier and Aiken, 2016; Martin-Misener et al., 2010; Schadewaldt et al., 2013),
- health promotion and prevention (Bailey et al., 2006; de Guzman et al., 2010; Jakimowicz et al., 2017; Martin-Misener et al., 2010; Van Soeren et al., 2011),
- patient education (Bailey et al., 2006; Carryer and Adams, 2017; de Guzman et al., 2010; Fletcher et al., 2011; Gould et al., 2007; Jakimowicz et al., 2017; Martin-Misener et al., 2010; Poghosyan et al., 2015; Schadewaldt et al., 2016, 2013; Zapatka et al., 2014),
- administrative and managerial activities (Burgess and Sawchenko, 2011; Cant et al., 2011; de Guzman et al., 2010; Fletcher et al., 2011; Schadewaldt et al., 2016, 2013; Van Soeren et al., 2011),
- resource for colleagues (e.g. consultation) (Altersved et al., 2011; Burgess and Sawchenko, 2011; MacDonald, 2005; Sangster-Gormley et al., 2015; Schadewaldt et al., 2013),
- working with underserved or vulnerable populations (Burgess and Sawchenko, 2011; Carryer et al., 2011; Conger and Plager, 2008; de Guzman et al., 2010; Gould et al., 2007; Jakimowicz et al., 2017; MacDonald, 2005; Martin-Misener et al., 2010; Sangster-Gormley et al., 2015; Xue et al., 2016).

A small number of studies reported the incorporation of teaching and research (Van Soeren et al., 2011), making referrals to other services (Maier and Aiken, 2016; Price and Williams, 2003), or carrying out roles such as mentoring (Burgess and Sawchenko, 2011) or patient advocacy (Weiland, 2015; Zapatka et al., 2014), within the Advanced Nurse Practitioner role.

Thirty studies (Altersved et al., 2011; Athey et al., 2016; Bailey et al., 2006; Cant et al., 2011; Carryer and Adams, 2017; Carryer et al., 2011; Conger and Plager, 2008; Contandriopoulos et al., 2015; de Guzman et al., 2010; DiCenso et al., 2010; Faraz, 2017; Jarrell, 2016; Kraus and DuBois, 2017; MacDonald, 2005; Mackay, 2003; Maier and Aiken, 2016; Main et al., 2007; Parker et al., 2013; Perry et al., 2005; Petersen and Wray, 2012; Poghosyan et al., 2015; Price and Williams, 2003; Sangster-Gormley et al., 2011; Schadewaldt et al., 2013; Spetz et al., 2017; Sullivan-Bentz et al., 2010; Van Soeren et al., 2011; Weiland, 2015; Zapatka et al., 2014; Zug et al., 2016) described the formal qualifications Advanced Nurse Practitioners had completed. This ranged from an undergraduate (bachelor degree or baccalaureate) to post-graduate qualifications (diploma, masters or doctorate level study). The Advanced Nurse Practitioners described across these studies had extensive experience and/ or significant training beyond their undergraduate degree, which enabled them to practice in an extended role. The length of time in practice was reported in 19 studies (Altersved et al., 2011; Bailey et al., 2006; Cant et al., 2011; Carryer and Adams, 2017; Conger and Plager, 2008; de Guzman et al., 2010; Donelan et al., 2013; Faraz, 2017; Faraz, 2016; Fletcher et al., 2011; Gould et al., 2007; Jarrell, 2016; Ljungbeck and Sjogren Forss, 2017; Petersen and Wray, 2012; Poghosyan et al., 2015; Sullivan-Bentz et al., 2010; Van Soeren et al., 2011; Weiland, 2015; Wilson et al., 2002). Studies described the range of time in practice for the more experienced Advanced Nurse Practitioners from 1 to 13 years in their current advanced role. Several studies also reported that Advanced Nurse Practitioners had up to 20 years of prior experience as Registered Nurses before becoming an Advanced Nurse Practitioner (de Guzman et al., 2010; Gould et al., 2007; Kraus and DuBois, 2017; Sullivan-Bentz et al., 2010). Six studies focused on novice or newly graduated Advanced Nurse Practitioners, within 2 years of practice in an advanced role (Altersved et al., 2011; Conger and Plager, 2008; Faraz, 2017, 2016; Jarrell, 2016; Wilson et al., 2002).

Thirteen studies (Burgess and Sawchenko, 2011; Cant et al., 2011; Hansen-Turton et al., 2013; Heale et al., 2016; Jakimowicz et al., 2017; Lindblad et al., 2010; MacDonald, 2005; McKenna et al., 2015; Parker et al., 2013; Perry et al., 2005; Price and Williams, 2003; Schadewaldt et al., 2016; Xue et al., 2016) referred to the progression and development of the Advanced Nurse Practitioner role, occurring at both an individual and organisational level. From an individual nursing perspective, some nurses were trying to use their knowledge to expand and develop the role further and this was assisted with developing trust and collaborative relationships with other healthcare professionals (Burgess and Sawchenko, 2011; Jakimowicz et al., 2017; Lindblad et al., 2010; Price and Williams, 2003). Advanced Nurse Practitioners required time to develop confidence and skills to progress to a higher level of practice (MacDonald, 2005). However, a lack of support from practice management meant nurses often moved on before an advanced role could be developed sufficiently (McKenna et al., 2015). In the USA the number of companies credentialing (i.e., verifying Advanced Nurse Practitioners and admitting them to their contracted provider networks), Advanced Nurse Practitioners as primary care providers rose from 33% in 2005 to 74% in 2012 (Hansen-Turton et al., 2013). In Canada under a Nurse Practitioner-Led Clinic model Advanced Nurse Practitioners were working as primary care providers (Heale et al., 2016). However, gaps in primary care provision by Advanced Nurse Practitioners were reported, impeded by restrictive state regulations on scope of practice (Xue et al., 2016).

Advanced Nurse Practitioners were described as working at a level of independent practice in 14 studies (Athey et al., 2016; Cant et al., 2011; Fletcher et al., 2011; Hansen-Turton et al., 2013; Jakimowicz et al., 2017; Kraus and DuBois, 2017; Lindblad et al., 2010; Pittman et al., 2016; Poghosyan et al., 2015; Sangster-Gormley et al., 2015; Schadewaldt et al., 2016, 2013; Weiland, 2015; Wilson et al., 2005), but also had an inter-professional collaborative role (Altersved et al., 2011; Bailey et al., 2006; Burgess and Sawchenko, 2011; Cant et al., 2011; Donelan et al., 2013; Gould et al., 2007; Heale et al., 2016; Kraus and DuBois, 2017; Martin-Misener et al., 2010; Poghosyan et al., 2015; Sangster-Gormley et al., 2015; Schadewaldt et al., 2016, 2013; Van Soeren et al., 2011; Wilson et al., 2005; Zapatka et al., 2014). All Advanced Nurse Practitioners were working in primary healthcare settings, including general practice (Jakimowicz et al., 2017; McKenna et al., 2015; Wilson et al., 2002) and health centres or clinics (Carryer and Adams, 2017; Conger and Plager, 2008; MacDonald, 2005; Parker et al., 2013; Pittman et al., 2016; Wilson et al., 2005). Advanced Nurse Practitioners worked specifically in rural settings in 7 studies (Bailey et al., 2006; Cant et al., 2011; Carryer and Adams, 2017; Carryer et al., 2011; Conger and Plager, 2008; Gould et al., 2007; Martin-Misener et al., 2010).

3.4.1. Expected role

Thirty one studies described expectations of the Advanced Nurse Practitioner role (Altersved et al., 2011; Bailey et al., 2006; Burgess and Sawchenko, 2011; Cant et al., 2011; Carr et al., 2002; Carryer and Adams, 2017; Contandriopoulos et al., 2015; de Guzman et al., 2010; DiCenso et al., 2010; Donelan et al., 2013; Gould et al., 2007; Hansen-Turton et al., 2013; Heale et al., 2016; Jakimowicz et al., 2017; Kraus and DuBois,

2017; Lindblad et al., 2010; Ljungbeck and Sjogren Forss, 2017; MacDonald, 2005; Mackay, 2003; Martin-Misener et al., 2010; Nasaif, 2012; Parker et al., 2013; Perry et al., 2005; Poghosyan et al., 2015; Price and Williams, 2003; Sangster-Gormley et al., 2015; Schadewaldt et al., 2016, 2013; Street and Cossman, 2010; Wilson et al., 2005; Zapatka et al., 2014). More than one third of these studies expected that Advanced Nurse Practitioners would collaborate with other healthcare professionals, ensuring teamwork was central to patient care (Bailey et al., 2006; Cant et al., 2011; Contandriopoulos et al., 2015; DiCenso et al., 2010; Gould et al., 2007; Heale et al., 2016; Kraus and DuBois, 2017; Ljungbeck and Sjogren Forss, 2017; Mackay, 2003; Sangster-Gormley et al., 2015; Zapatka et al., 2014). Participants from 6 studies reported that they expected Advanced Nurse Practitioners to work as a substitute for a doctor, overlapping with their practice (Bailey et al., 2006; Martin-Misener et al., 2010; Nasaif, 2012; Perry et al., 2005; Poghosyan et al., 2015; Wilson et al., 2005). However, there was disagreement about which tasks should be carried out by Advanced Nurse Practitioners (Mackay, 2003; Martin-Misener et al., 2010; Nasaif, 2012; Sangster-Gormley et al., 2015). There was a lack of consensus about the level of autonomy that Advanced Nurse Practitioners should have, with some studies advocating the use of a protocol (Carr et al., 2002), or under supervision from doctors using a partnership agreement (Contandriopoulos et al., 2015; Kraus and DuBois, 2017; Schadewaldt et al., 2013; Street and Cossman, 2010).

3.4.2. Actual role

Twenty nine studies described the actual role of the Advanced Nurse Practitioner (Altersved et al., 2011; Athey et al., 2016; Bailey et al., 2006; Burgess and Sawchenko, 2011; Cant et al., 2011; Carryer and Adams, 2017; Carryer et al., 2011; de Guzman et al., 2010; DiCenso et al., 2010; Donelan et al., 2013; Fletcher et al., 2011; Gould et al., 2007; Hansen-Turton et al., 2013; Heale et al., 2016; Jakimowicz et al., 2017; Lindblad et al., 2010; MacDonald, 2005; Maier and Aiken, 2016; Main et al., 2007; Martin-Misener et al., 2010; Poghosyan et al., 2015; Price and Williams, 2003; Sangster-Gormley et al., 2015; Schadewaldt et al., 2016; Spetz et al., 2017; Van Soeren et al., 2011; Weiland, 2015; Wilson et al., 2005; Zapatka et al., 2014). Participants described Advanced Nurse Practitioners sharing patient care, or undertaking a similar (or complementary) role to doctors in 7 studies (Altersved et al., 2011; MacDonald, 2005; Poghosyan et al., 2015; Sangster-Gormley et al., 2015; Schadewaldt et al., 2016; Van Soeren et al., 2011; Wilson et al., 2005). Other studies reported that Advanced Nurse Practitioners were still working in traditional roles, similar to other nurses, or assisting doctors in their day-to-day practice (Bailey et al., 2006; Donelan et al., 2013; Fletcher et al., 2011; MacDonald, 2005; Martin-Misener et al., 2010). A key part of the Advanced Nurse Practitioner role was provision of education for patients (Bailey et al., 2006; Carryer and Adams, 2017; de Guzman et al., 2010; DiCenso et al., 2010; Fletcher et al., 2011; Gould et al., 2007; Jakimowicz et al., 2017; Martin-Misener et al., 2010; Poghosyan et al., 2015; Zapatka et al., 2014). Advanced Nurse Practitioners were providing patient care and treatment, through delivering specific services, such as health promotion, prevention services, wellness clinics, sexual health clinics and maternity services (Burgess and Sawchenko, 2011; de Guzman et al., 2010; DiCenso et al., 2010; Fletcher et al., 2011; Jakimowicz et al., 2017; Martin-Misener et al., 2010; Poghosyan et al., 2015; Van Soeren et al., 2011), and for specific patient groups, including delivering care for both chronic and acute care needs (Burgess and Sawchenko, 2011; DiCenso et al., 2010; Fletcher et al., 2011; Jakimowicz et al., 2017; Lindblad et al., 2010; MacDonald, 2005; Martin-Misener et al., 2010; Poghosyan et al., 2015; Sangster-Gormley et al., 2015; Spetz et al., 2017; Van Soeren et al., 2011). They were also providing outreach and care for vulnerable and marginalised groups (Burgess and Sawchenko, 2011; DiCenso et al., 2010; Gould et al., 2007; Jakimowicz et al., 2017; MacDonald, 2005; Martin-Misener et al., 2010; Van Soeren et al., 2011). Although Advanced Nurse Practitioners were considered to be working as independent practitioners, the level of autonomy for carrying out the role varied considerably, including whether they could, for example, prescribe and order tests independently (Athey et al., 2016; Bailey et al., 2006; Cant et al., 2011; Carryer and Adams, 2017; Carryer et al., 2011; DiCenso et al., 2010; Donelan et al., 2013; Fletcher et al., 2011; Hansen-Turton et al., 2013; Heale et al., 2016; Lindblad et al., 2010; MacDonald, 2005; Maier and Aiken, 2016; Main et al., 2007; Martin-Misener et al., 2010; Poghosyan et al., 2015; Price and Williams, 2003; Schadewaldt et al., 2016; Weiland, 2015) without oversight or a countersignature from a doctor.

3.5. Barriers and facilitators to the implementation of the advanced nurse practitioner role

3.5.1. Barriers

A total of 536 barriers were extracted across 54 studies. Multiple barriers were identified within each study, ranging from 3 to 41. These were mapped to 16 of the 19 of the predefined codes (Table 1). Active failures (in individual performance or behaviour), scheduling and bed management or design of equipment and supplies were not reported as barriers to implementation of the Advanced Nurse Practitioner role. The frequency of identification of each of the pre-defined barriers (with the addition of the 'other' category) is summarised in Fig. 2 and key examples can be found in Supplementary File 12). The volume of evidence to support each barrier and facilitator is reported below, as 'substantial', 'moderate' or 'low'.

Substantial volume of evidence: Barriers to implementation supported by a substantial amount of evidence (across 20 or more studies) included: team factors; lines of responsibility; individual factors; staff workload; and 'other' factors. These represented 66% of the total number of barriers reported (Fig. 2).

Team factors: 'Team factors' were the most frequently reported barrier to the implementation of the Advanced Nurse Practitioner role, described across 37 studies (Bailey et al., 2006; Burgess and Sawchenko, 2011; Cant et al., 2011; Carryer and Adams, 2017; Carryer et al., 2011; Conger and Plager, 2008; Contandriopoulos et al., 2015; de Guzman et al., 2010; DiCenso et al., 2010; Donelan et al., 2013; Faraz, 2016; Fletcher et al., 2011; Gould et al., 2007; Jakimowicz et al., 2017; Lindblad et al., 2010; MacDonald, 2005; Mackay, 2003; Maier and Aiken, 2016; Main et al., 2007; Martin-Misener et al., 2010; McKenna et al., 2015; Parker et al., 2013; Perry et al., 2005; Pittman et al., 2016; Poghosyan et al., 2015; Price and Williams, 2003; Rashid, 2010; Rigolosi and Salmond, 2014; Sangster-Gormley et al., 2011; Schadewaldt et al., 2016; Schadewaldt et al., 2013; Street and Cossman, 2010; Sullivan-Bentz et al., 2010; Weiland, 2015; Wilson et al., 2002; Wilson et al., 2005; Zug et al., 2016). A number of subthemes arose in this category. For example, several studies described challenges such as a lack of awareness of the role (Carryer et al., 2011; Contandriopoulos et al., 2015; Jakimowicz et al., 2017; Mackay, 2003; Parker et al., 2013; Schadewaldt et al., 2013; Sullivan-Bentz et al., 2010) and acceptance of the role from doctors and other health professionals (Faraz, 2016; Gould et al., 2007; Jakimowicz et al., 2017; MacDonald, 2005; Price and Williams, 2003; Sangster-Gormley et al., 2015; Schadewaldt et al., 2013). One study described this as a *"constant battle to be recognised"* (Jakimowicz et al., 2017, p9) (Jakimowicz et al., 2017). Difficulties or tensions in the collaborative relationship were identified across a range of studies. Resistance to the implementation of the Advanced Nurse Practitioner role arose from both inter-professional (e.g. general

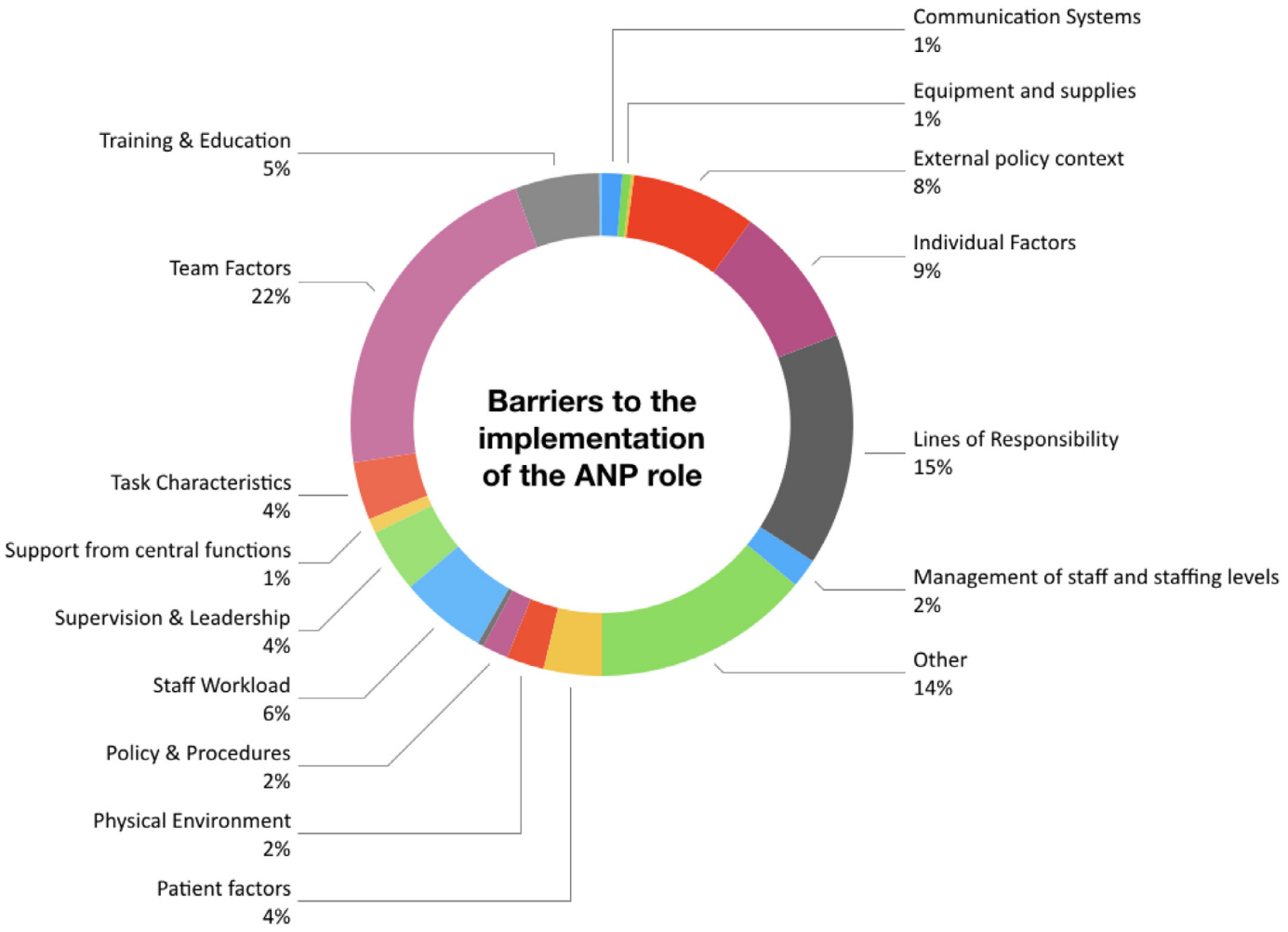

Fig. 2. Donut chart of barriers to the implementation of the Advanced Nurse Practitioner role in primary care.

practitioners; consultants) (de Guzman et al., 2010; DiCenso et al., 2010; Gould et al., 2007; Jakimowicz et al., 2017; Lindblad et al., 2010; MacDonald, 2005; Maier and Aiken, 2016; Main et al., 2007; Martin-Misener et al., 2010; Rigolosi and Salmond, 2014; Schadewaldt et al., 2016; Schadewaldt et al., 2013; Street and Cossman, 2010; Wilson et al., 2005), and intra-professional groups (e.g. Advanced Nurse Practitioner colleagues) (Contandriopoulos et al., 2015; Lindblad et al., 2010; Main et al., 2007). Consequently, some studies reported that team members were reluctant or even refused to work collaboratively with Advanced Nurse Practitioners, for example, declining referrals or refusing to share information (Cant et al., 2011; Conger and Plager, 2008; de Guzman et al., 2010; Gould et al., 2007; Jakimowicz et al., 2017; Main et al., 2007).

Lines of responsibility: The second most frequently reported barrier was 'lines of responsibility' which was reported across 32 studies (Altersved et al., 2011; Bailey et al., 2006; Cant et al., 2011; Carryer and Adams, 2017; Carryer et al., 2011; Choi and De Gagne, 2016; Conger and Plager, 2008; Contandriopoulos et al., 2015; de Guzman et al., 2010; DiCenso et al., 2010; Donelan et al., 2013; Faraz, 2017; Faraz, 2016; Fletcher et al., 2011; Gould et al., 2007; Jakimowicz et al., 2017; Lindblad et al., 2010; MacDonald, 2005; Mackay, 2003; Main et al., 2007; Martin-Misener et al., 2010; Parker et al., 2013; Perry et al., 2005; Poghosyan et al., 2015; Price and Williams, 2003; Schadewaldt et al., 2016; Schadewaldt et al., 2013; Sullivan-Bentz et al., 2010; Van Soeren et al., 2011; Weiland, 2015; Wilson et al., 2002; Zug et al., 2016). Studies described challenges such as restrictions being placed on the Advanced Nurse Practitioners responsibilities and scope of practice, including their ability to work autonomously (Altersved et al., 2011; Choi and De Gagne, 2016; DiCenso et al., 2010; Fletcher et al., 2011; Gould et al., 2007; Jakimowicz et al., 2017; MacDonald, 2005; Main et al., 2007; Martin-Misener et al., 2010; Perry et al., 2005; Price and Williams, 2003; Schadewaldt et al., 2016; Schadewaldt et al., 2013; Sullivan-Bentz et al., 2010; Van Soeren et al., 2011; Weiland, 2015; Wilson et al., 2002). A lack of clear understanding in relation to the Advanced Nurse Practitioner role was described frequently from the perspective of the clinical team and management, including doctors and nurse colleagues (Bailey et al., 2006; Carryer et al., 2011; Contandriopoulos et al., 2015; de Guzman et al., 2010; DiCenso et al., 2010; Faraz, 2017; Faraz, 2016; Fletcher et al., 2011; Jakimowicz et al., 2017; Lindblad et al., 2010; Mackay, 2003; Martin-Misener et al., 2010; Parker et al., 2013; Poghosyan et al., 2015; Price and Williams, 2003; Schadewaldt et al., 2016; Sullivan-Bentz et al., 2010; Van Soeren et al., 2011; Weiland, 2015; Wilson et al., 2002; Zug et al., 2016). The role was not clearly defined in relation to other team members (Bailey et al., 2006; Contandriopoulos et al., 2015; Donelan et al., 2013; Fletcher et al., 2011; Jakimowicz et al., 2017; Perry et al., 2005; Poghosyan et al., 2015; Schadewaldt et al., 2013; Sullivan-Bentz et al., 2010; Weiland, 2015; Wilson et al., 2002) and expectations about the scope of practice varied (Cant et al., 2011; Carryer

and Adams, 2017; Contandriopoulos et al., 2015; DiCenso et al., 2010; Fletcher et al., 2011; Gould et al., 2007; Jakimowicz et al., 2017; MacDonald, 2005; Main et al., 2007; Martin-Misener et al., 2010; Perry et al., 2005; Price and Williams, 2003; Schadewaldt et al., 2013; Van Soeren et al., 2011; Wilson et al., 2002).

'Other' factors: Thirty studies included barriers which were coded as 'other' (Cant et al., 2011; Carr et al., 2002; Carryer and Adams, 2017; Carryer et al., 2011; Choi and De Gagne, 2016; Contandriopoulos et al., 2015; de Guzman et al., 2010; DiCenso et al., 2010; Donelan et al., 2013; Gould et al., 2007; Heale et al., 2016; Jakimowicz et al., 2017; Ljungbeck and Sjogren Forss, 2017; Mackay, 2003; Maier and Aiken, 2016; Main et al., 2007; Martin-Misener et al., 2010; McKenna et al., 2015; Parker et al., 2013; Pittman et al., 2016; Poghosyan et al., 2015; Price and Williams, 2003; Schadewaldt et al., 2016, 2013; Sullivan-Bentz et al., 2010; Van Soeren et al., 2011; Weiland, 2015; Wilson et al., 2002, 2005; Zug et al., 2016) and therefore did not fit with the pre-defined codes These primarily referred to barriers in relation to uncertainty about the continuation of funding for the role (Cant et al., 2011; Carr et al., 2002; Carryer and Adams, 2017; Carryer et al., 2011; de Guzman et al., 2010; DiCenso et al., 2010; Mackay, 2003; Main et al., 2007; Martin-Misener et al., 2010; McKenna et al., 2015; Sullivan-Bentz et al., 2010; Van Soeren et al., 2011; Wilson et al., 2002) and financial reimbursement arrangements for primary care practitioners. This gave rise to uncertainty about the financial sustainability of Advanced Nurse Practitioners due to loss of income (Contandriopoulos et al., 2015; DiCenso et al., 2010; Poghosyan et al., 2015; Schadewaldt et al., 2016, 2013; Sullivan-Bentz et al., 2010; Wilson et al., 2002, 2005) and in some cases created financial competition between doctors and Advanced Nurse Practitioners (Cant et al., 2011; Choi and De Gagne, 2016; DiCenso et al., 2010; Maier and Aiken, 2016; Weiland, 2015).

Individual factors: 'Individual factors' were reported as a key barrier in 24 studies (Bailey et al., 2006; Burgess and Sawchenko, 2011; Carryer et al., 2011; Conger and Plager, 2008; de Guzman et al., 2010; Faraz, 2017, 2016; Fletcher et al., 2011; Heale et al., 2016; Jakimowicz et al., 2017; Ljungbeck and Sjogren Forss, 2017; MacDonald, 2005; Mackay, 2003; Main et al., 2007; Martin-Misener et al., 2010; McKenna et al., 2015; Poghosyan et al., 2015; Rashid, 2010; Schadewaldt et al., 2016, 2013; Street and Cossman, 2010; Weiland, 2015; Wilson et al., 2002, 2005). From an Advanced Nurse Practitioner perspective one of the main factors which had a negative impact on implementation was a lack of confidence in competence or ability to carry out the role. There was self-doubt about their knowledge-base that affected their ability to, for example, prescribe or make autonomous decisions (Burgess et al., 2011; Carryer et al., 2011; Faraz, 2016; Fletcher et al., 2011; Jakimowicz et al., 2017; Ljungbeck and Sjogren Forss, 2017; Main et al., 2007; Rashid, 2010; Schadewaldt et al., 2016, 2013). Doctors also lacked confidence in the education, knowledge and skill-base of Advanced Nurse Practitioners and their competence to take on the extended role (Bailey et al., 2006; Fletcher et al., 2011; Jakimowicz et al., 2017; Mackay, 2003; Schadewaldt et al., 2013; Wilson et al., 2002, 2005).

Staff workload: Staff workload was described as a major obstacle in 21 studies (Altersved et al., 2011; Burgess and Sawchenko, 2011; Carryer et al., 2011; Choi and De Gagne, 2016; Conger and Plager, 2008; Contandriopoulos et al., 2015; Faraz, 2016; Fletcher et al., 2011; Heale et al., 2016; Jakimowicz et al., 2017; Lindblad et al., 2010; Mackay, 2003; Main et al., 2007; McKenna et al., 2015; Perry et al., 2005; Rashid, 2010; Schadewaldt et al., 2016, 2013; Sullivan-Bentz et al., 2010; Wilson et al., 2002; Zug et al., 2016). Studies described both the anticipation of increased burden and healthcare professionals' experience of increased burden. Doctors in particular described the additional responsibility of providing supervision for the Advanced Nurse Practitioners but also there was an indication General Practitioners would be seeing more complex patients with a changing case mix (Altersved et al., 2011; Burgess and Sawchenko, 2011; Choi and De Gagne, 2016; Conger and Plager, 2008; Contandriopoulos et al., 2015; Fletcher et al., 2011; Heale et al., 2016; Jakimowicz et al., 2017; Lindblad et al., 2010; Mackay, 2003; Perry et al., 2005; Schadewaldt et al., 2013) as a result of the Advanced Nurse Practitioner role. Studies referred to limitations on Advanced Nurse Practitioner time. These included limitations on their ability to provide holistic care to patients and being released to engage in continuing professional development, due to their busyness. (Carryer et al., 2011; Contandriopoulos et al., 2015; Faraz, 2016; Jakimowicz et al., 2017; McKenna et al., 2015; Perry et al., 2005; Schadewaldt et al., 2016; Sullivan-Bentz et al., 2010).

3.5.2. Moderate volume of evidence

Barriers to implementation of the Advanced Nurse Practitioner role which were supported by a moderate amount of evidence (between 10 and 19 studies) included: external policy context; training and education; supervision and leadership; patient factors; and the physical environment.

External policy context: Nineteen studies considered the external policy context (Bailey et al., 2006; Carryer et al., 2011; de Guzman et al., 2010; DiCenso et al., 2010; Donelan et al., 2013; Hansen-Turton et al., 2013; Kraus and DuBois, 2017; Kuo et al., 2013; Lindblad et al., 2010; Mackay, 2003; Maier and Aiken, 2016; Main et al., 2007; Pittman et al., 2016; Poghosyan et al., 2015; Schadewaldt et al., 2016; Schadewaldt et al., 2013; Sullivan-Bentz et al., 2010; Weiland, 2015; Wilson et al., 2002). Eleven of the 19 studies referred to the legislation and regulation restrictions of the Advanced Nurse Practitioner role in the USA (Donelan et al., 2013; Hansen-Turton et al., 2013; Kraus and DuBois, 2017; Kuo et al., 2013; Pittman et al., 2016; Poghosyan et al., 2015; Weiland, 2015) and Canada (Bailey et al., 2006; de Guzman et al., 2010; DiCenso et al., 2010; Sullivan-Bentz et al., 2010) (Fig. 4(a)). Prescribing, ordering tests and making referrals were common areas where government legislation restricted the everyday scope of practice. (Carryer et al., 2011; de Guzman et al., 2010; DiCenso et al., 2010; Donelan et al., 2013; Kraus and DuBois, 2017; Lindblad et al., 2010; Pittman et al., 2016; Sullivan-Bentz et al., 2010; Weiland, 2015). Where there was uncertainty about medico-legal responsibility, including the legal requirement for supervision arrangements with doctors, Advanced Nurse Practitioner practice was restricted (Bailey et al., 2006; Poghosyan et al., 2015; Schadewaldt et al., 2016, 2013). Restrictions on independent practice, was further affected by legislation in relation to financial reimbursement. For example, billing policies, such as those in the Medicare system, often reimbursed Advanced Nurse Practitioners at a lower rate than doctors for providing primary care (DiCenso et al., 2010; Hansen-Turton et al., 2013; Mackay, 2003; Maier and Aiken, 2016; Poghosyan et al., 2015; Schadewaldt et al., 2016, 2013).

Training and education: Sixteen studies described difficulties with training and education for Advanced Nurse Practitioners (Carryer et al., 2011; Contandriopoulos et al., 2015; DiCenso et al., 2010; Faraz, 2016; Jakimowicz et al., 2017; Ljungbeck and Sjogren Forss, 2017; Main et al., 2007; Martin-Misener et al., 2010; McKenna et al., 2015; Price and Williams, 2003; Rashid, 2010; Schadewaldt et al., 2013; Sullivan-Bentz et al., 2010; Wilson et al., 2002; Zapatka et al., 2014; Zug et al., 2016). Concerns were expressed by both nurses and doctors about the ability of nurses to meet the competencies required and the adequacy of training provided to carry out the role (Carryer et al., 2011; DiCenso et al., 2010; Faraz, 2016; Ljungbeck and Sjogren Forss, 2017; Main et al., 2007; McKenna et al., 2015; Rashid, 2010; Schadewaldt et al., 2013; Wilson et al., 2002; Zapatka et al., 2014; Zug et al., 2016).

Access to, and funding of, continuing professional development was an ongoing issue, which posed a challenge to implementation of the Advanced Nurse Practitioner role (Contandriopoulos et al., 2015; Jakimowicz et al., 2017; McKenna et al., 2015; Price and Williams, 2003; Sullivan-Bentz et al., 2010).

Supervision and leadership: Sixteen studies (Carryer and Adams, 2017; Carryer et al., 2011; Choi and De Gagne, 2016; Conger and Plager, 2008; Contandriopoulos et al., 2015; de Guzman et al., 2010; Faraz, 2016; Fletcher et al., 2011; Heale et al., 2016; Jarrell, 2016; McKenna et al., 2015; Petersen and Wray, 2012; Poghosyan et al., 2015; Price and Williams, 2003; Street and Cossman, 2010; Sullivan-Bentz et al., 2010) described supervision and leadership as a barrier to implementation. Most of these studies were from Canada and the USA (10/16) (Conger and Plager, 2008; Contandriopoulos et al., 2015; de Guzman et al., 2010; Fletcher et al., 2011; Heale et al., 2016; Jarrell, 2016; Petersen et al., 2015; Poghosyan et al., 2015; Street and Cossman, 2010; Sullivan-Bentz et al., 2010) (Fig. 4(a)). A lack of support from health leaders and managers impeded implementation (Carryer and Adams, 2017; Carryer et al., 2011; Contandriopoulos et al., 2015; de Guzman et al., 2010; McKenna et al., 2015; Sullivan-Bentz et al., 2010). There were also problems with availability and quality of mentoring and supervision (Carryer et al., 2011; Conger and Plager, 2008; Faraz, 2016; Heale et al., 2016; Price and Williams, 2003; Sullivan-Bentz et al., 2010). The requirement in many areas for supervision, mainly facilitated by doctors was perceived to increase their workload and had a negative impact on the autonomy of Advanced Nurse Practitioner practice (Choi and De Gagne, 2016; Fletcher et al., 2011; Petersen and Wray, 2012; Poghosyan et al., 2015; Street and Cossman, 2010).

Task characteristics: Task characteristics were identified as a barrier in fourteen studies (Altersved et al., 2011; Contandriopoulos et al., 2015; de Guzman et al., 2010; DiCenso et al., 2010; Gould et al., 2007; Jakimowicz et al., 2017; MacDonald, 2005; Mackay, 2003; Parker et al., 2013; Perry et al., 2005; Rashid, 2010; Schadewaldt et al., 2013; Van Soeren et al., 2011; Wilson et al., 2002). Nine of these fourteen studies were from Canada (Contandriopoulos et al., 2015; de Guzman et al., 2010; DiCenso et al., 2010; Gould et al., 2007; Van Soeren et al., 2011) and the UK (MacDonald, 2005; Perry et al., 2005; Rashid, 2010; Wilson et al., 2002) (Fig. 4(a)). Studies described how Advanced Nurse Practitioners were prevented from carrying out patient-related tasks such as prescribing, ordering tests and making referrals (Altersved et al., 2011; Contandriopoulos et al., 2015; DiCenso et al., 2010; Gould et al., 2007; Jakimowicz et al., 2017; MacDonald, 2005; Mackay, 2003; Parker et al., 2013; Perry et al., 2005; Schadewaldt et al., 2013; Van Soeren et al., 2011; Wilson et al., 2002). These limitations, mainly due to resistance from healthcare professionals (Gould et al., 2007; Jakimowicz et al., 2017; Mackay, 2003; Perry et al., 2005; Schadewaldt et al., 2013) or the Advanced Nurse Practitioners legal rights in relation to practice (Altersved et al., 2011; Contandriopoulos et al., 2015; DiCenso et al., 2010; Gould et al., 2007; Mackay, 2003; Perry et al., 2005; Schadewaldt et al., 2013; Van Soeren et al., 2011; Wilson et al., 2002), had the potential to inconvenience patients and other healthcare professionals but also impact on quality of care.

Patient factors: Thirteen studies described patient factors as barriers to Advanced Nurse Practitioner implementation (Bailey et al., 2006; Choi and De Gagne, 2016; Contandriopoulos et al., 2015; de Guzman et al., 2010; Faraz, 2016; Gould et al., 2007; Jakimowicz et al., 2017; Kuo et al., 2013; Parker et al., 2013; Rashid, 2010; Schadewaldt et al., 2013; Van Soeren et al., 2011; Wilson et al., 2002). Eight of these were from Canada (Bailey et al., 2006; Contandriopoulos et al., 2015; de Guzman et al., 2010; Gould et al., 2007; Van Soeren et al., 2011) and multiple regions (Faraz, 2016; Jakimowicz et al., 2017; Schadewaldt et al., 2013). These studies emphasised the lack of acceptance of the Advanced Nurse Practitioner role from patients (Choi and De Gagne, 2016; Faraz, 2016; Gould et al., 2007; Parker et al., 2013). Individual patient factors such as negative beliefs about the Advanced Nurse Practitioner role, their preference of healthcare professional (Rashid, 2010; Wilson et al., 2002) and patient complexity (Contandriopoulos et al., 2015; de Guzman et al., 2010; Jakimowicz et al., 2017; Parker et al., 2013) also presented barriers to role implementation.

Physical environment: Eleven studies (Cant et al., 2011; Conger and Plager, 2008; Contandriopoulos et al., 2015; DiCenso et al., 2010; Donelan et al., 2013; Faraz, 2016; Jakimowicz et al., 2017; Main et al., 2007; Poghosyan et al., 2015; Schadewaldt et al., 2016; Zug et al., 2016) referred to problems within the physical environment (i.e., work setting) including a lack of infrastructure to support the Advanced Nurse Practitioner role. Studies described the work setting as particularly challenging, for example due to a shortage of physical space (e.g., rooms) to accommodate Advanced Nurse Practitioners (DiCenso et al., 2010; Donelan et al., 2013; Faraz, 2016; Poghosyan et al., 2015; Schadewaldt et al., 2016; Zug et al., 2016). Advanced Nurse Practitioners also described having to work in isolation due to the work setting or working in rural settings (Cant et al., 2011; Conger and Plager, 2008; Jakimowicz et al., 2017; Main et al., 2007; Schadewaldt et al., 2016).

3.5.3. Low volume of evidence

Barriers to Advanced Nurse Practitioner implementation which were supported by a small amount of evidence (less than 10 studies) included: policy and procedures; communication systems; support for central functions; quality and safety culture and equipment and supplies. The evidence for these types of barriers came mainly from studies conducted in North America (Fig. 4(a), Supplementary File 12)

Policies and procedures: Seven studies (DiCenso et al., 2010; Donelan et al., 2013; Martin-Misener et al., 2010; Poghosyan et al., 2015; Schadewaldt et al., 2016; Sullivan-Bentz et al., 2010; Van Soeren et al., 2011) (6/7 from North America) described local policies and procedures which restricted Advanced Nurse Practitioner practice. Hospital regulations and localised practice policies meant Advanced Nurse Practitioners were unable to be employed as primary care practitioners or demanded collaborative agreements were in place with doctors, making it more difficult to undertake the Advanced Nurse Practitioner role independently.

Management of staff and staffing levels: Six studies (Altersved et al., 2011; Contandriopoulos et al., 2015; de Guzman et al., 2010; DiCenso et al., 2010; Jakimowicz et al., 2017; MacDonald, 2005; Rashid, 2010) described difficulties with supply and demand of staff within primary care. Some areas would not employ an Advanced Nurse Practitioner irrespective of a shortage of GPs, for example hiring choices could be influenced by the history of the organisation (Carr et al., 2002; DiCenso et al., 2010; Pittman et al., 2016). There were also issues with recruiting and retaining Advanced Nurse Practitioners (Heale et al., 2016; McKenna et al., 2015; Pittman et al., 2016).

Communication systems: Five studies (Cant et al., 2011; Conger and Plager, 2008; Contandriopoulos et al., 2015; DiCenso et al., 2010; Price and Williams, 2003) (3/5 from North America, Fig. 4(a)) identified issues in relation to communication systems and processes. Sharing information was frequently challenging due to problems with technology (Conger and Plager, 2008; DiCenso et al., 2010), but also because of the process and administration of sharing information across borders (Conger and Plager, 2008), the primary-secondary care interface (Conger and Plager, 2008; Price and Williams, 2003) and between health professionals (Cant et al., 2011; Contandriopoulos et al., 2015).

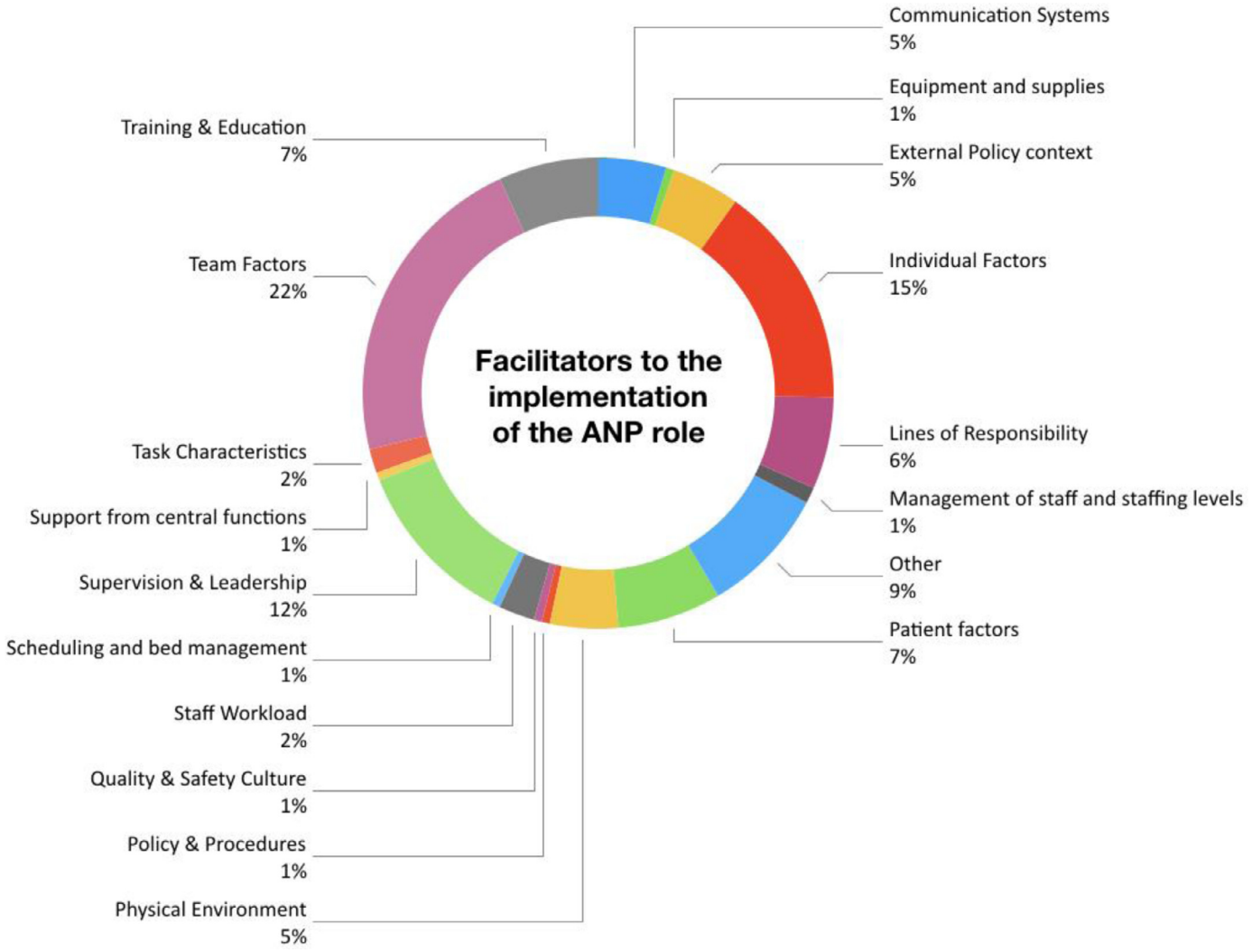

Fig. 3. Donut chart of facilitators to the implementation of the Advanced Nurse Practitioner role in primary care.

Support from central functions: Five studies (Contandriopoulos et al., 2015; de Guzman et al., 2010; DiCenso et al., 2010; MacDonald, 2005) (4/5 from North America, Fig. 4(a)) referred to the difficulties in receiving support from administrative staff. This was attributed to administrative failures but also to difficulties in understanding the Advanced Nurse Practitioner role.

Equipment and supplies: Two studies (Conger and Plager, 2008; DiCenso et al., 2010) from North America (Fig. 4(a)) reported that having inadequate basic resources, such as access to a phone or telemedicine, contributed to problems with implementation.

Quality and safety culture: Two studies (Donelan et al., 2013; Schadewaldt et al., 2013) indicated that doctors did not believe that Advanced Nurse Practitioners would have a positive impact of quality of care.

3.5.4. Facilitators

A total of 371 facilitators were extracted across 54 studies. Multiple facilitators were identified within each study, ranging from 1 to 27. These were mapped to 17 of the 19 of the predefined codes (Table 1). No studies referred to active failures or design of equipment and supplies as facilitators to implementation of the Advanced Nurse Practitioner role. The frequency of identification of each of the pre-defined facilitators (including the code 'other') is summarised in Fig. 3 and key examples of facilitators can be found in Supplementary File 13).

3.5.5. Substantial volume of evidence

Facilitators supported by a large amount of evidence (20 or more studies) included: team factors; individual factors; and 'other' factors. These represented 46% of all coded facilitators (Fig. 3).

Team factors: Team factors were the most frequently reported contributing factor facilitating the implementation of the Advanced Nurse Practitioner role (n=31) (Bailey et al., 2006; Burgess and Sawchenko, 2011; Cant et al., 2011; Carr et al., 2002; Carryer and Adams, 2017; Choi and De Gagne, 2016; Conger and Plager, 2008; Contandriopoulos et al., 2015; de Guzman et al., 2010; DiCenso et al., 2010; Faraz, 2016; Fletcher et al., 2011; Gould et al., 2007; Jakimowicz et al., 2017; Kraus and DuBois, 2017; Lindblad et al., 2010; MacDonald, 2005; Main et al., 2007; Martin-Misener et al., 2010; Nasaif, 2012; Parker et al., 2013; Petersen et al., 2015; Poghosyan et al., 2015; Price and Williams, 2003; Rashid, 2010; Sangster-Gormley et al., 2015; Schadewaldt et al., 2016; Schadewaldt et al., 2013; Street and Cossman, 2010; Weiland, 2015; Zapatka et al., 2014). The ability to collaborate (Bailey et al., 2006; Burgess and Sawchenko, 2011; Choi and De Gagne, 2016; Conger and Plager, 2008; Contandriopoulos et al., 2015; Faraz, 2016; Gould et al., 2007; Petersen et al., 2015; Schadewaldt et al., 2016, 2013; Weiland, 2015) and develop trust and have good relationships with doctors and other colleagues (Cant et al., 2011; Carryer and Adams, 2017; Contandriopoulos et al., 2015; de Guzman et al., 2010; DiCenso et al., 2010; Jakimowicz et al., 2017; Poghosyan

et al., 2015; Sangster-Gormley et al., 2015; Schadewaldt et al., 2016; Schadewaldt et al., 2013; Street and Cossman, 2010) were "*central to the success of the Advanced Nurse Practitioner role integration*" (Burgess and Purkis, 2010, p300). Support for the role from doctors, nursing colleagues and other health professionals (Choi and De Gagne, 2016; Conger and Plager, 2008; de Guzman et al., 2010; DiCenso et al., 2010; Jakimowicz et al., 2017; Kraus and DuBois, 2017; Main et al., 2007; Martin-Misener et al., 2010; Nasaif, 2012; Poghosyan et al., 2015; Price and Williams, 2003; Rashid, 2010; Sangster-Gormley et al., 2015; Schadewaldt et al., 2013; Zapatka et al., 2014) was also a key facilitator. Doctors' positive beliefs and attitudes about Advanced Nurse Practitioner competence and the scope of practice were also indicated as facilitators to integration and implementation of the Advanced Nurse Practitioner role (Carr et al., 2002; Fletcher et al., 2011; Lindblad et al., 2010; MacDonald, 2005; Schadewaldt et al., 2013; Street and Cossman, 2010).

Individual factors: Individual factors were also widely cited as a facilitator in 26 studies (Bailey et al., 2006; Burgess and Sawchenko, 2011; Cant et al., 2011; Carryer and Adams, 2017; Carryer et al., 2011; Choi and De Gagne, 2016; Conger and Plager, 2008; Contandriopoulos et al., 2015; de Guzman et al., 2010; DiCenso et al., 2010; Fletcher et al., 2011; Jakimowicz et al., 2017; Kraus and DuBois, 2017; MacDonald, 2005; Martin-Misener et al., 2010; Nasaif, 2012; Parker et al., 2013; Perry et al., 2005; Price and Williams, 2003; Sangster-Gormley et al., 2015; Schadewaldt et al., 2016, 2013; Street and Cossman, 2010; Sullivan-Bentz et al., 2010; Wilson et al., 2005). Studies highlighted the strengths that Advanced Nurse Practitioners could bring to their role in primary care in relation to their personal skills and abilities (Burgess and Sawchenko, 2011; Cant et al., 2011; Choi and De Gagne, 2016; DiCenso et al., 2010; Fletcher et al., 2011; Jakimowicz et al., 2017; Kraus and DuBois, 2017; MacDonald, 2005; Martin-Misener et al., 2010; Perry et al., 2005; Sangster-Gormley et al., 2015; Sullivan-Bentz et al., 2010), including their knowledge-base (Burgess and Sawchenko, 2011; Cant et al., 2011; de Guzman et al., 2010; Kraus and DuBois, 2017; Parker et al., 2013). Individual qualities were highlighted such as *"adaptability, their ability to provide routine primary care with ease, and the benefits of their unique nursing approach to patient care."* Kraus and DuBois (2017, p286). Previous experience that health professionals had of working with Advanced Nurse Practitioners in primary care, (Bailey et al., 2006; Jakimowicz et al., 2017; Price and Williams, 2003; Schadewaldt et al., 2013; Street and Cossman, 2010) in addition to the experience Advanced Nurse Practitioners brought to the role, assisted implementation (Kraus and DuBois, 2017; Sullivan-Bentz et al., 2010; Wilson et al., 2005). As Advanced Nurse Practitioners developed experience, they gained confidence in their abilities to carry out tasks and collaborate with colleagues helping them to integrate into their role in primary care (Cant et al., 2011; MacDonald, 2005; Schadewaldt et al., 2013; Wilson et al., 2002).

'Other' factors: Twenty studies included facilitators coded as 'other' (Burgess and Sawchenko, 2011; Carr et al., 2002; Carryer and Adams, 2017; Choi and De Gagne, 2016; Conger and Plager, 2008; Contandriopoulos et al., 2015; de Guzman et al., 2010; DiCenso et al., 2010; Faraz, 2016; Heale et al., 2016; Jarrell, 2016; MacDonald, 2005; Main et al., 2007; McKenna et al., 2015; Pittman et al., 2016; Price and Williams, 2003; Schadewaldt et al., 2016, 2013; Spetz et al., 2017; Wilson et al., 2005). These mainly referred to continued funding of the role in terms of salaries and financial reimbursement (Conger and Plager, 2008; de Guzman et al., 2010; DiCenso et al., 2010; Heale et al., 2016; McKenna et al., 2015; Pittman et al., 2016; Schadewaldt et al., 2013; Spetz et al., 2017; Wilson et al., 2005) in addition to planning for role integration and role negotiation based on the needs of patients, colleagues and organisations (Contandriopoulos et al., 2015; DiCenso et al., 2010; MacDonald, 2005; Main et al., 2007; Price and Williams, 2003; Schadewaldt et al., 2016).

3.5.6. Moderate volume of evidence

Facilitators supported by a moderate amount of evidence (between 10 and 19 studies) included: supervision and leadership, training and education, lines of responsibility, external policy context, patient factors, the physical environment, and communication systems. These contributory factors accounted for 47% of all the facilitators coded (Fig. 3).

Supervision and leadership: Nineteen studies (Burgess and Sawchenko, 2011; Carryer et al., 2011; Conger and Plager, 2008; Contandriopoulos et al., 2015; de Guzman et al., 2010; DiCenso et al., 2010; Faraz, 2016; Jarrell, 2016; Kraus and DuBois, 2017; Lindblad et al., 2010; Ljungbeck and Sjogren Forss, 2017; Petersen and Wray, 2012; Poghosyan et al., 2015; Price and Williams, 2003; Rigolosi and Salmond, 2014; Sangster-Gormley et al., 2015; Sullivan-Bentz et al., 2010; Zapatka et al., 2014; Zug et al., 2016) reported on factors of supervision and leadership. The majority of studies (13/19) were from Canada (Burgess and Sawchenko, 2011; Contandriopoulos et al., 2015; de Guzman et al., 2010; DiCenso et al., 2010; Sangster-Gormley et al., 2015; Sullivan-Bentz et al., 2010) and the USA (Conger and Plager, 2008; Jarrell, 2016; Kraus and DuBois, 2017; Petersen and Wray, 2012; Poghosyan et al., 2015; Rigolosi and Salmond, 2014; Zapatka et al., 2014) (Fig. 4(b)). Implementation required strong support and leadership from managers, doctors and senior nursing colleagues including project champions (Burgess and Sawchenko, 2011; de Guzman et al., 2010; DiCenso et al., 2010; Poghosyan et al., 2015; Price and Williams, 2003; Sangster-Gormley et al., 2015; Zug et al., 2016). The importance of mentoring and supervision, mainly from doctors, was central to providing support and building confidence during transition into the role (Carryer et al., 2011; Conger and Plager, 2008; Contandriopoulos et al., 2015; DiCenso et al., 2010; Faraz, 2016; Jarrell, 2016; Kraus and DuBois, 2017; Lindblad et al., 2010; Ljungbeck and Sjogren Forss, 2017; Petersen and Wray, 2012; Price and Williams, 2003; Sullivan-Bentz et al., 2010; Zapatka et al., 2014).

Training and education: Eighteen studies, conducted mainly in North America ($n = 9$) (Bailey et al., 2006; Burgess and Sawchenko, 2011; Conger and Plager, 2008; Contandriopoulos et al., 2015; DiCenso et al., 2010; Donelan et al., 2013; Jarrell, 2016; Pittman et al., 2016; Zapatka et al., 2014) and Oceania (Cant et al., 2011; Carryer and Adams, 2017; Carryer et al., 2011; McKenna et al., 2015; Parker et al., 2013) ($n = 5$) (Fig. 4(b)) described the contribution of training and education to facilitation of implementation of the Advanced Nurse Practitioner role (Bailey et al., 2006; Burgess and Sawchenko, 2011; Cant et al., 2011; Carryer and Adams, 2017; Carryer et al., 2011; Conger and Plager, 2008; Contandriopoulos et al., 2015; DiCenso et al., 2010; Donelan et al., 2013; Faraz, 2016; Jakimowicz et al., 2017; Jarrell, 2016; Maier and Aiken, 2016; McKenna et al., 2015; Parker et al., 2013; Pittman et al., 2016; Zapatka et al., 2014; Zug et al., 2016). The integration of training into everyday practice provided Advanced Nurse Practitioners with the skills to extend their practice (Burgess and Sawchenko, 2011; Cant et al., 2011; Carryer and Adams, 2017; Conger and Plager, 2008; Donelan et al., 2013; Zapatka et al., 2014). Support, from doctors, nursing colleagues, employers and within higher education, was also indicated as drivers for implementation. A formal educational pathway preparing Advanced Nurse Practitioners for the role and continuing their development throughout their career was essential to facilitate implementation (Bailey et al., 2006; DiCenso et al., 2010; Jakimowicz et al., 2017; Zapatka et al., 2014).

Lines of responsibility: Sixteen studies reported on the importance of lines of responsibility (Bailey et al., 2006;

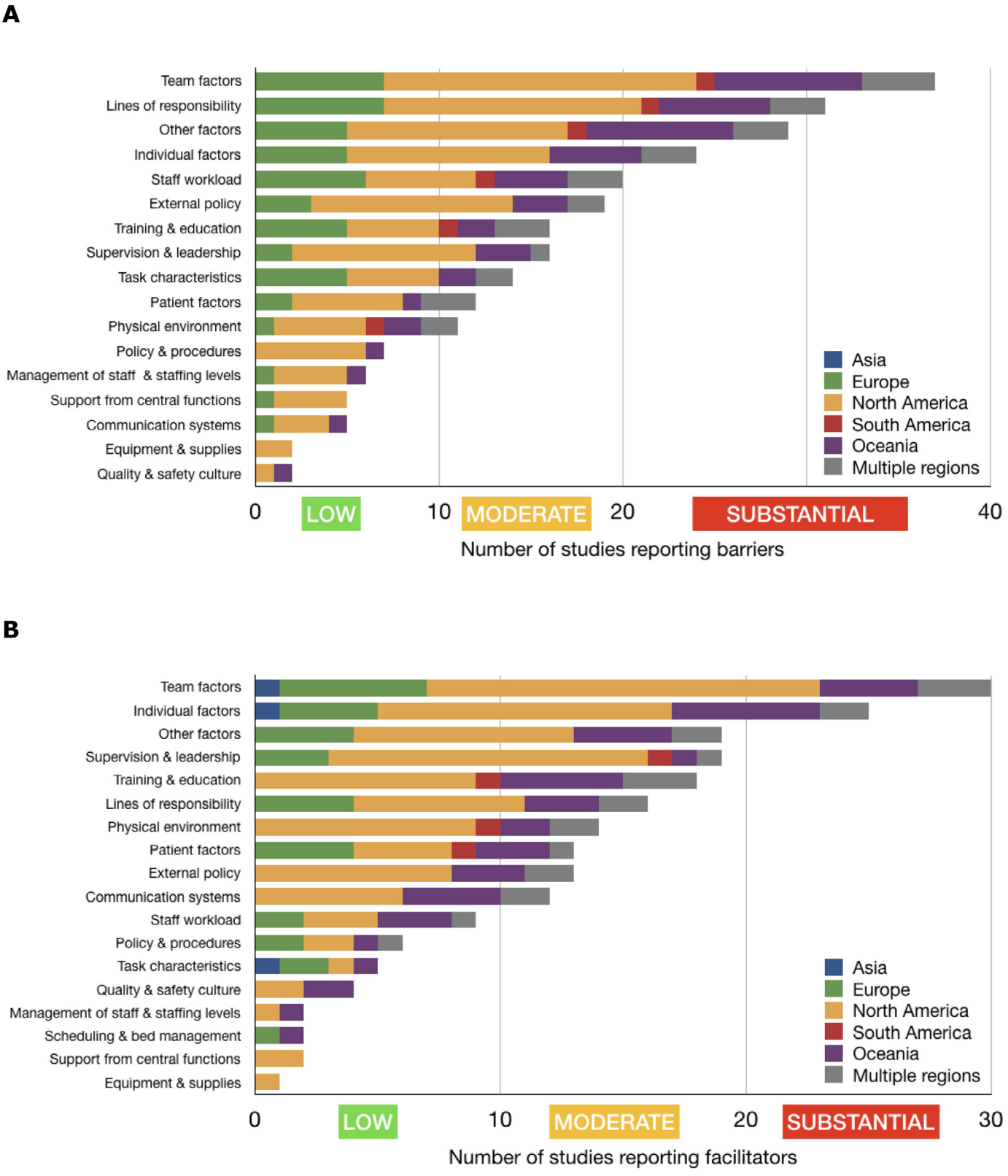

Fig. 4. Stacked bar chart showing (A) barriers and (B) facilitators reported across different continents.

Burgess and Sawchenko, 2011; Contandriopoulos et al., 2015; de Guzman et al., 2010; DiCenso et al., 2010; Faraz, 2016; Kraus and DuBois, 2017; Ljungbeck and Sjogren Forss, 2017; MacDonald, 2005; Mackay, 2003; McKenna et al., 2015; Parker et al., 2013; Price and Williams, 2003; Rashid, 2010; Schadewaldt et al., 2013; Weiland, 2015). An appropriate and coherent definition of the Advanced Nurse Practitioner role was key to implementation, reducing the ambiguity and lack of understanding that surrounded the role (Contandriopoulos et al., 2015; de Guzman et al., 2010; Faraz, 2016; Ljungbeck and Sjogren Forss, 2017;

McKenna et al., 2015; Rashid, 2010). This included negotiation with other health professionals to reach consensus and clarity about expectations, scope of practice, working with others and distinctions between the Advanced Nurse Practitioner role and that of other members of the multi-disciplinary team e.g. GP and other nursing roles (Bailey et al., 2006; Contandriopoulos et al., 2015; DiCenso et al., 2010; Kraus and DuBois, 2017; Ljungbeck and Sjogren Forss, 2017; MacDonald, 2005; Mackay, 2003; Parker et al., 2013; Price and Williams, 2003; Schadewaldt et al., 2013).

Physical environment: Fourteen studies (Athey et al., 2016; Burgess and Sawchenko, 2011; Conger and Plager, 2008; Contandriopoulos et al., 2015; DiCenso et al., 2010; Jakimowicz et al., 2017; Kraus and DuBois, 2017; McKenna et al., 2015; Petersen and Wray, 2012; Poghosyan et al., 2015; Schadewaldt et al., 2016, 2013; Spetz et al., 2017; Zug et al., 2016) of which 9 were conducted in North America (Athey et al., 2016; Burgess and Sawchenko, 2011; Conger and Plager, 2008; Contandriopoulos et al., 2015; DiCenso et al., 2010; Kraus and DuBois, 2017; Petersen et al., 2015; Poghosyan et al., 2015; Spetz et al., 2017) (Fig. 4(b)) described the physical environment as a facilitator of implementation of the Advanced Nurse Practitioner role. A favourable practice or work setting was particularly useful in facilitating implementation. Of importance were practices where the Advanced Nurse Practitioner role could be developed and where practices enhanced the Advanced Nurse Practitioners ability to provide patient care (Athey et al., 2016; Burgess and Sawchenko, 2011; Jakimowicz et al., 2017; Kraus and DuBois, 2017; McKenna et al., 2015; Poghosyan et al., 2015; Schadewaldt et al., 2016) and whether the Advanced Nurse Practitioner was practising in a rural or urban location (Kraus and DuBois, 2017; Petersen and Wray, 2012; Spetz et al., 2017; Zug et al., 2016). In relation to the working environment co-location of health professionals and Advanced Nurse Practitioners also appeared to support the implementation process (Conger and Plager, 2008; DiCenso et al., 2010; Schadewaldt et al., 2013).

External policy context: The external policy context was reported as an important facilitator in 13 studies (Contandriopoulos et al., 2015; de Guzman et al., 2010; DiCenso et al., 2010; Hansen-Turton et al., 2013; Mackay, 2003; Maier and Aiken, 2016; McKenna et al., 2015; Petersen and Wray, 2012; Rigolosi and Salmond, 2014; Schadewaldt et al., 2013; Spetz et al., 2017; Wilson et al., 2005; Xue et al., 2016). Of these, 8 were conducted in North America (Hansen-Turton et al., 2013; McKenna et al., 2015; Petersen et al., 2015; Rigolosi and Salmond, 2014; Spetz et al., 2017; Wilson et al., 2005; Xue et al., 2016) (Fig. 4b). Removal of legislative barriers (Maier and Aiken, 2016; Rigolosi and Salmond, 2014) and a favourable policy environment (DiCenso et al., 2010; Hansen-Turton et al., 2013; Mackay, 2003; Petersen and Wray, 2012; Schadewaldt et al., 2013; Wilson et al., 2005) supporting autonomy and full scope of practice (e.g., prescribing rights) were key drivers of implementation of the Advanced Nurse Practitioner role. There was a distinction concerning the legal requirements between states for example in rural and urban locations (Petersen and Wray, 2012; Rigolosi and Salmond, 2014; Spetz et al., 2017; Xue et al., 2016) making some areas more favourable for implementation of the Advanced Nurse Practitioner role.

Patient factors: Thirteen studies (Carr et al., 2002; Carryer et al., 2011; de Guzman et al., 2010; DiCenso et al., 2010; Heale et al., 2016; Jakimowicz et al., 2017; MacDonald, 2005; Mackay, 2003; Parker et al., 2013; Price and Williams, 2003; Zug et al., 2016) referred to patient factors as facilitators of implementation of the Advanced Nurse Practitioner role. Patient acceptance and support was a key facilitator of implementation (Carryer et al., 2011; Mackay, 2003; Parker et al., 2013; Price and Williams, 2003; Zug et al., 2016). Advanced Nurse Practitioners were perceived to be able to meet the needs of patients, including being able to provide care for more complex patients such as those with multi-morbidity (Carryer et al., 2011; Mackay, 2003; Parker et al., 2013; Price and Williams, 2003; Zug et al., 2016).

Communication systems: Twelve studies (Burgess and Swchenko, 2011; Cant et al., 2011; Conger and Plager, 2008; Contandriopoulos et al., 2015; de Guzman et al., 2010; DiCenso et al., 2010; Jakimowicz et al., 2017; McKenna et al., 2015; Parker et al., 2013; Rigolosi and Salmond, 2014; Schadewaldt et al., 2016, 2013) conducted mainly in North America (Burgess and Sawchenko, 2011; Conger and Plager, 2008; Contandriopoulos et al., 2015; de Guzman et al., 2010; DiCenso et al., 2010; Rigolosi and Salmond, 2014) ($n=6$) and Australia ($n=4$) (Cant et al., 2011; McKenna et al., 2015; Parker et al., 2013; Schadewaldt et al., 2016) described the importance of communication (Fig. 4(b)). Sharing information and linking with other health professionals, legislators and patients through the use of communication strategies and technology fostered relationships and facilitated implementation. Studies also described the positive influence of the communication style of Advanced Nurse Practitioners for developing relationships (Jakimowicz et al., 2017; Parker et al., 2013; Rigolosi and Salmond, 2014).

3.5.7. Low volume of evidence

A range of other facilitators were supported by a low volume of evidence (less than 10 studies).

Staff workload: Nine studies (Bailey et al., 2006; Cant et al., 2011; Carr et al., 2002; Contandriopoulos et al., 2015; Parker et al., 2013; Perry et al., 2005; Schadewaldt et al., 2016, 2013; Spetz et al., 2017) highlighted the importance of staff workload, specifically highlighting the potential to reduce the burden on doctors by freeing them up for other activities such as managing the more complex patients. There was a perception that Advanced Nurse Practitioners were able to increase access to care for patients (Cant et al., 2011; Perry et al., 2005).

Policies and procedures: Six studies (Cant et al., 2011; DiCenso et al., 2010; Heale et al., 2016; Jakimowicz et al., 2017; Lindblad et al., 2010; Wilson et al., 2002) referred to the organisational processes such as developing policy guidelines and protocols to enhance implementation of the role.

Task characteristics: Task characteristics including examinations, prescribing, referrals and discharging patients, related to the role and the confidence and ability to carry out activities facilitated implementation in 5 studies (Carryer and Adams, 2017; de Guzman et al., 2010; MacDonald, 2005; Nasaif, 2012; Wilson et al., 2002).

Quality and safety culture: Four studies (Cant et al., 2011; Donelan et al., 2013; Heale et al., 2016; Parker et al., 2013) identified quality and safety as an important facilitator. These studies drew attention to the positive impact of an Advanced Nurse Practitioner's knowledge and skills on the overall quality of patient care.

Management of staff or staffing levels, scheduling or bed management and support from central functions: Studies rarely referred to management of staff or staffing levels (de Guzman et al., 2010; McKenna et al., 2015), scheduling or bed management (Carr et al., 2002; Schadewaldt et al., 2016) or support from central functions (de Guzman et al., 2010; Poghosyan et al., 2015). Facilitators in these categories included: coverage for the Advanced Nurse Practitioner when on leave or after hours; planning patient care; and having administrative support.

Equipment and supplies: one study suggested access and availability of resources needed for patient care supported implementation (Petersen and Wray, 2012).

4. Discussion

Our review identified 54 studies, varying in methodological quality, which reported 536 barriers to, and 371 facilitators of, implementation of the Advanced Nurse Practitioner role in primary care settings. Many of the factors identified as barriers were also facilitators. For example, team factors were the most frequently reported barrier *and* facilitator to the implementation of the Advanced Nurse Practitioner role. Our review also identified a wide range of activities reported to be part of the Advanced Nurse Practitioner role and uncovered widespread disagreement in relation to the tasks Advanced Nurse Practitioners should carry out, the extent their role should overlap with doctors, and the level of autonomy they should have in their practice.

4.1. Barriers

Studies described high levels of ambiguity about the role and numerous restrictions placed on Advanced Nurse Practitioners autonomy and scope of practice (Altersved et al., 2011; Bailey et al., 2006; Cant et al., 2011; Carryer and Adams, 2017; Carryer et al., 2011; Choi and De Gagne, 2016; Conger and Plager, 2008; Contandriopoulos et al., 2015; de Guzman et al., 2010; DiCenso et al., 2010; Donelan et al., 2013; Faraz, 2017, 2016; Fletcher et al., 2011; Gould et al., 2007; Jakimowicz et al., 2017; Lindblad et al., 2010; MacDonald, 2005; Mackay, 2003; Main et al., 2007; Martin-Misener et al., 2010; Parker et al., 2013; Perry et al., 2005; Poghosyan et al., 2015; Price and Williams, 2003; Schadewaldt et al., 2016, 2013; Sullivan-Bentz et al., 2010; Van Soeren et al., 2011; Weiland, 2015; Wilson et al., 2002; Zug et al., 2016). This was associated with a lack of understanding and acceptance from colleagues about the Advanced Nurse Practitioner role which caused difficulties in developing collaborative working relationships with doctors and the wider multi-disciplinary team.

Tensions arising between Advanced Nurse Practitioners and doctors were particularly difficult, both in terms of challenges within the collaborative relationship and in recognising the individual characteristics required for the role. Doctors were uncomfortable with the change in roles in primary care (Bailey et al., 2006; Ljungbeck and Sjogren Forss, 2017; Main et al., 2007; Street and Cossman, 2010; Wilson et al., 2002, 2005). They lacked confidence in the adequacy of the training and education provided for the advanced nursing role and therefore in the nurse's skills and abilities to take on the responsibility for such a role (Jakimowicz et al., 2017; Mackay, 2003; Main et al., 2007; Schadewaldt et al., 2013; Wilson et al., 2002). The case for introducing the Advanced Nurse Practitioner role as a means of lightening the load for doctors was undermined both by perceptions and experience of increasing burden. For example, doctors anticipated increasing demands on their time due to consultation with and supervision of Advanced Nurse Practitioners (Mackay, 2003). The experiences of working with Advanced Nurse Practitioners, reported by doctors, suggested their workload had increased (Fletcher et al., 2007; Main et al., 2007), perhaps providing some rationale for opposition to implementation in an already over-stretched primary care service. The resistance from doctors in particular made the shift from traditional nursing roles and from the hierarchical relationship between nurse and doctor difficult to achieve in primary care. (Bailey et al., 2006; Burgess and Sawchenko, 2011; Cant et al., 2011; Carr et al., 2002; Carryer and Adams, 2017; Choi and De Gagne, 2016; Conger and Plager, 2008; Contandriopoulos et al., 2015; de Guzman et al., 2010; DiCenso et al., 2010; Faraz, 2016; Fletcher et al., 2011; Gould et al., 2007; Jakimowicz et al., 2017; Kraus and DuBois, 2017; Lindblad et al., 2010; MacDonald, 2005; Martin-Misener et al., 2010; Nasaif, 2012; Parker et al., 2013; Petersen and Wray, 2012; Poghosyan et al., 2015; Sangster-Gormley et al., 2015; Schadewaldt et al., 2016, 2013; Street and Cossman, 2010; Weiland, 2015; Zapatka et al., 2014).

On an individual basis confidence was also a key barrier for nurses engaged in the Advanced Nurse Practitioner role that proved a challenge to implementation. There was considerable self-doubt among nurses in relation to their competencies to take on an advanced role (Burgess and Sawchenko, 2011; Carryer et al., 2011; Faraz, 2016; Fletcher et al., 2011; Main et al., 2007; Rashid, 2010; Schadewaldt et al., 2016). For example, Advanced Nurse Practitioners were concerned about the expectations of the role, managing their time, having increasing responsibility and a more complex caseload while working in isolation with sometimes limited access to support. Concerns were also raised about the sustainability of the Advanced Nurse Practitioner role within the current practice and policy context. Across all geographical regions there was uncertainty about a role without the guarantee of funding or financial reimbursement similar to primary care physicians (Cant et al., 2011; Carr et al., 2002; Carryer and Adams, 2017; Choi and De Gagne, 2016; de Guzman et al., 2010; DiCenso et al., 2010; Donelan et al., 2013; Gould et al., 2007; Heale et al., 2016; Ljungbeck and Sjogren Forss, 2017; Mackay, 2003; Maier and Aiken, 2016; Main et al., 2007; Martin-Misener et al., 2010; McKenna et al., 2015; Pittman et al., 2016; Poghosyan et al., 2015; Schadewaldt et al., 2016, 2013; Van Soeren et al., 2011; Weiland, 2015; Wilson et al., 2002).

One key distinction mainly found in North America was the evidence reported in relation to barriers with infrastructure. Although described by a small number of studies, and representing 7% of all barriers reported (i.e., physical environment, local policy and procedures, support from central functions, equipment and supplies, communication systems) the lack of appropriate infrastructure to support the role was a key challenge not demonstrated to the same extent across other regions.

4.2. Facilitators

Building collaborative and supportive relationships between Advanced Nurse Practitioners and other health professionals, particularly doctors, facilitated implementation of the Advanced Nurse Practitioner role. Doctors, in particular, needed to believe in the role and the positive impact it could have. Beliefs about what the individual brought to the role i.e. experience, confidence, skills and knowledge base, was of importance and was valued by other healthcare professionals (Bailey et al., 2006; Burgess and Sawchenko, 2011; Cant et al., 2011; Carryer and Adams, 2017; Carryer et al., 2011; Choi and De Gagne, 2016; Conger and Plager, 2008; Contandriopoulos et al., 2015; de Guzman et al., 2010; DiCenso et al., 2010; Fletcher et al., 2011; Jakimowicz et al., 2017; Kraus and DuBois, 2017; MacDonald, 2005; Martin-Misener et al., 2010; Nasaif, 2012; Parker et al., 2013; Perry et al., 2005; Price and Williams, 2003; Sangster-Gormley et al., 2015; Schadewaldt et al., 2016, 2013; Street and Cossman, 2010; Sullivan-Bentz et al., 2010; Wilson et al., 2005).

Support for the Advanced Nurse Practitioner role at an organisational and individual level was paramount to successful implementation. Strong leadership was required to ensure there was adequate planning and negotiation for the role to be integrated meaningfully into practice. Support from leaders was also necessary for adequate provision of mentorship and supervision for Advanced Nurse Practitioners to flourish and progress. Financial support was also a key requirement to allay fears surrounding continued funding for education and practice.

There were several contributory factors which were not reported within European studies as facilitators of implementation of the Advanced Nurse Practitioner role. Some of these reflected the infrastructural barriers presented within the North American

literature in this case specifically, the physical environment, communication systems, support from central functions and equipment and supplies. Of interest was that training and education was also not reported as a facilitator within European studies. Whereas in other regions preparation for the role, through training and education and continuing professional development, was key to fostering confidence in delivering the advanced role (Bailey et al., 2006; Burgess and Sawchenko, 2011; Cant et al., 2011; Carr et al., 2002; Carryer and Adams, 2017; Choi and De Gagne, 2016; Conger and Plager, 2008; Contandriopoulos et al., 2015; de Guzman et al., 2010; DiCenso et al., 2010; Faraz, 2016; Fletcher et al., 2011; Gould et al., 2007; Jakimowicz et al., 2017; Kraus and DuBois, 2017; Lindblad et al., 2010; MacDonald, 2005; Martin-Misener et al., 2010; Nasaif, 2012; Parker et al., 2013; Petersen and Wray, 2012; Poghosyan et al., 2015; Sangster-Gormley et al., 2015; Schadewaldt et al., 2016, 2013; Street and Cossman, 2010; Weiland, 2015; Zapatka et al., 2014). In addition, the external policy context was frequently represented as a facilitator within North American and Oceania studies however was not as frequently reported within individual European studies. The lack of reporting potentially indicates that the practice infrastructure exists for the Advanced Nurse Practitioner role in Europe and training and legislation are already embedded.

Our findings echo those reported by Faraz (2016) and Sangster-Gormley et al. (2011) where themes such as ambiguity, the quality of relationships and intrinsic and extrinsic factors, including confidence and lack of acceptance and support were reported as barriers or facilitators to implementation (Faraz, 2016). Only 4/54 studies included in this review overlapped with those included in Faraz (2016) (Sullivan-Bentz et al., 2010; Zapatka et al., 2014) and Sangster-Gormley reviews (Gould et al., 2007; Van Soeren et al., 2011). Whereas Faraz (2016) review included 9 studies that focused on the initial transition period post-training, we have widened our approach to implementation at all levels of practice. We also used an operational definition of Advanced Nurse Practitioners which has supported our focus on advanced practice, through selecting participants with expertise and expanded practice in primary care.

Sangster-Gormley et al. (2011) identified extensive evidence of multiple influential factors at the practice level for implementation of the Advanced Nurse Practitioner role; however, system level barriers were less frequently reported (Sangster-Gormley et al., 2011). Our review however found a moderate to substantial body of evidence that suggested that legislation and regulation as well as funding and financial reimbursement, were important factors for implementation of the advanced role. Supervision and leadership was also described as both an important facilitator as well as a barrier to implementation in particular in the North American context. Our review indicates that implementation issues at an organisational and system level are problematic and there has been no systematic approach to combat these.

Our review confirms the complexity of implementation from a multi-level perspective, requiring consideration of factors at an individual, organisational, practice and systems level.

4.3. The advanced nurse practitioner role in primary care

Our review also reveals how particular barriers and facilitators affect the role and scope of Advanced Nurse Practitioner practice in primary care. In the studies reviewed, Advanced Nurse Practitioners could be a first point of contact, undertaking assessments, ordering tests and providing patient care. Advanced Nurse Practitioners followed patients through treatment. They delivered patient education and cared for specific patient groups, such as people living with diabetes and vulnerable groups. Study participants expected Advanced Nurse Practitioners to work in collaboration with other healthcare professionals. In terms of actual practice, Advanced Nurse Practitioners sometimes shared activities with doctors, however, there was significant variability in the level of autonomy and activities carried out. Despite legislation, which enabled Advanced Nurse Practitioners to practice autonomously, for example making referrals, prescribing, or ordering tests, Advanced Nurse Practitioners were often not working at the full scope of practice. This could be reflective of the ambiguity and lack of agreement that existed around expectations of the Advanced Nurse Practitioner role, which was a recurring obstacle in relation to implementation. This also highlights the gap between legislation and practice.

Disagreement existed regarding what was expected of Advanced Nurse Practitioners and the role they should carry out. Across studies, there was a lack of consistency between Advanced Nurse Practitioner roles as well as diversity within their scope and sphere of practice. To successfully implement the Advanced Nurse Practitioner role requires role definition and criteria. However key to the success of the role is the negotiation of the role between team members and reaching consensus on how the different health professionals work together. The role of the Advanced Nurse Practitioner often seems to be an isolated one, different from other nurses, different from doctors, and carried out with limited collaboration with the wider multidisciplinary team. Our review suggested that role definition and planning at the team level is an opportunity to reflect on current practice and models of care so as to establish a shared vision for the team, which is flexible to changing needs.

5. Limitations

Although we carried out a comprehensive search with inclusive selection criteria it is possible that we may not have identified all published papers in this area. Due to resource constraints we were unable to independently screen at the abstract level which may have impacted on the studies included. However, cross-checking was employed, and full texts were screened independently. In addition, it was agreed within our protocol to only include nurses who met the International Council of Nurse's (ICN) definition of an Advanced Nurse Practitioner and to have a strict focus on primary care.

Progression of the advanced role has been piecemeal, with a number of different iterations over the course of its development in different healthcare settings. This fragmented approach, the variation in the nature of the Advanced Nurse Practitioner role and the training and education of Advanced Nurse Practitioners globally means we may have inadvertently missed capturing all of the evidence from studies reporting on implementation of the role for all nurses considered to be Advanced Nurse Practitioners.

5.1. Implications for practice

Since the studies in this review were published, there has been considerable investment in the educational preparation for and the development of advanced practice roles across the UK and further afield, not just in nursing but across other professional groups. As Advanced Nurse Practitioner roles become more commonplace, it is likely that some of the barriers to implementation may lessen.

However, our review highlights that close attention to the multi-professional context in which Advanced Nurse Practitioners are placed is vital to ensuring that practitioners can practice to their full potential. A recent statement (AOMRC, 2017) from the royal colleges and professional bodies representing the health workforce across secondary and primary care provides high level

commitment to creating an environment which supports effective team working and new ways of working.

The 'Multi-professional framework for advanced practice in England' published in 2017 also provides clear support for advanced practice roles (HEE, 2017). The principles which this document sets out for planning and implementing such roles are consistent with the findings of our review, and include: considering where advanced clinical practice roles can best be placed within health and care pathways to maximise their impact; defining a clear purpose and objectives for advanced clinical practice roles; considering and evaluating the impact of advanced clinical practice roles on service user experience and outcomes and on service delivery and improvement objectives; ensuring clarity about the service area the individuals will work within; ensuring clear and unambiguous support for the role from the organisation/employer at all levels; and developing a succession plan for future workforce. The findings of this review add detailed insights into the specific barriers and facilitators which need to be considered when implementing advanced practice roles in primary care, and could be used by workforce planners and clinical teams to identify and map contextual issues that could impede the development and integration of Advanced Nurse Practitioners at a local and organisational level.

5.2. Implications for future research

In addition to strengthening the existing evidence base, we have identified three key areas for future research:

- Exploration of the impact of implementation of the Advanced Nurse Practitioner role in relation to patients and healthcare professionals, including doctors and the wider multidisciplinary team.
- Exploration of the Advanced Nurse Practitioner role from different stakeholder perspectives, in particular giving patients a voice, in relation to what works, for whom and in what circumstances?
- Evaluation of the effectiveness of the Advanced Nurse Practitioner on health outcomes.

6. Conclusions

Our scoping review presents a systematic synthesis of barriers and facilitators to implementation of the Advanced Nurse Practitioner role building and extending earlier work to include all levels of experience in primary care settings. Our review found clear gaps in the evidence base highlighting the importance of key relationships between Advanced Nurse Practitioners and other healthcare professionals. Building relationships, strengthening collaborative arrangements and negotiating the role are critical to the success of the implementation of the Advanced Nurse Practitioner role. Consensus about defining the role and how it should complement other healthcare professionals is vital.

Declaration of Competing Interest

None.

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Supplementary materials

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References

Altersved, E., Zetterlund, L., Lindblad, U., Fagerstrom, L., 2011. Advanced practice nurses: a new resource for Swedish primary health-care teams. Int. J. Nurs. Pract. 17, 174–180.
AOMRC, 2017. Joint Professions Statement. Academy of Medical Royal Colleges, UK.
Arksey, H., O'Malley, L., 2005. Scoping studies: towards a methodological framework. Int. J. Soc. Res. Methodol. 8, 19–32.
Athey, E.K., Leslie, M.S., Briggs, L.A., Park, J., Falk, N.L., Pericak, A., El-Banna, M.M., Greene, J., 2016. How important are autonomy and work setting to nurse practitioners' job satisfaction? J. Am. Assoc. Nurse Pract. 28 (6), 320–326.
Bailey, P., Jones, L., Way, D., 2006. Family physician/nurse practitioner: stories of collaboration. J. Adv. Nurs. 53 (4), 381–391.
Baird, B., C.A., Honeyman M, Maguire, D., Das, P., 2016. Understanding Pressures in General Practice. The Kings Fund, London, UK.
Burgess, J., Martin, A., Senner, W., 2011. A framework to assess nurse practitioner role integration in primary health care. Can. J. Nurs. Res. 43 (1), 22–40.
Burgess, J., Purkis, M.E., 2010. The power and politics of collaboration in nurse practitioner role development. Nurs. Inq. 17 (4), 297–308.
Burgess, J., Sawchenko, L., 2011. Community of practice: a nurse practitioner collaborative model. Nurs. Leadersh. 24 (2), 99–112.
Cant, R., Birks, M., Porter, J., Jacob, E., Cooper, S., 2011. Developing advanced rural nursing practice: a whole new scope of responsibility. Collegian 18 (4), 177–182.
Carnwell, R., Daly, W.M., 2003. Advanced nursing practitioners in primary care settings: an exploration of the developing roles. J. Clin. Nurs. 12 (5), 630–642.
Carr, J., Armstrong, S., Hancock, B., Bethea, J., 2002. GPs' perceptions of the nurse practitioner role in primary care. Br. J. Commun. Nurs. 7 (8), 408–413.
Carryer, J., Adams, S., 2017. Nurse practitioners as a solution to transformative and sustainable health services in primary health care: a qualitative exploratory study. Collegian 24, 525–531.
Carryer, J., Boddy, J., Budge, C., 2011. Rural nurse to nurse practitioner: an ad hoc process. J. Prim. Health Care 3 (1), 23–28.
Carter, N., Martin-Misener, R., Kilpatrick, K., Kaasalainen, S., Donald, F., Bryant-Lukosius, D., Harbman, P., Bourgeault, I., DiCenso, A., 2010. The role of nursing leadership in integrating clinical nurse specialists and nurse practitioners in healthcare delivery in Canada. Nurs. Leadersh. 23, 167–185 Spec No 2010.
CASP, 2018. Critical Appraisal Skills Programme Checklists. UK.
Choi, M., De Gagne, J.C., 2016. Autonomy of nurse practitioners in primary care: an integrative review. J. Am. Assoc. Nurse Pract. 28 (3), 170–174.
CNOD, 2017. Chief Nursing Officer Department (CNOD): Transforming Nursing, Midwifery and Health Professions Roles: Pushing the Boundaries to Meet Health and Social Care Needs: Paper one Introduction.
Conger, M., Plager, K., 2008. Advanced nursing practice in rural areas: connectedness vs. disconnectedness. Online J. Rural Nurs. Health Care 8 (1), 24–38.
Contandriopoulos, D., Brousselle, A., Dubois, C.A., Perroux, M., Beaulieu, M.D., Brault, I., Kilpatrick, K., D'Amour, D., Sansgter-Gormley, E., 2015. A process-based framework to guide nurse practitioners integration into primary healthcare teams: results from a logic analysis. BMC Health Serv. Res. 15, 78.
de Guzman, A., Ciliska, D., DiCenso, A., 2010. Nurse practitioner role implementation in Ontario public health units. Can. J. Public Health 101 (4), 309–313.
DiCenso, A., Martin-Misener, R., Bryant-Lukosius, D., Bourgeault, I., Kilpatrick, K., Donald, F., Kaasalainen, S., Harbman, P., Carter, N., Kioke, S., Abelson, J., McKinlay, R.J., Pasic, D., Wasyluk, B., Vohra, J., Charbonneau-Smith, R., 2010. Advanced practice nursing in Canada: overview of a decision support synthesis. Nurs. Leadersh. 23, 15–34 Spec No 2010.
DoH, 2010. Advanced Level Nursing: A Position Statement. Department of Health, UK.
Donald, F., Martin-Misener, R., Bryant-Lukosius, D., Kilpatrick, K., Kaasalainen, S., Carter, N., Harbman, P., Bourgeault, I., DiCenso, A., 2010. The primary healthcare nurse practitioner role in Canada. Nurs. Leadersh. 23, 88–113 Spec No 2010.
Donelan, K., DesRoches, C.M., Dittus, R.S., Buerhaus, P., 2013. Perspectives of physicians and nurse practitioners on primary care practice. N. Engl. J. Med. 368 (20), 1898–1906.
Faraz, A., 2017. Novice nurse practitioner workforce transition and turnover intention in primary care. J. Am. Assoc. Nurse Pract. 29 (1), 26–34.
Faraz, A., 2016. Novice nurse practitioner workforce transition into primary care: a literature review. West. J. Nurs. Res. 38 (11), 1531–1545.
Fletcher, C.E., Baker, S.J., Copeland, L.A., Reeves, P.J., Lowery, J.C., 2007. Nurse practitioners' and physicians' views of NPs as providers of primary care to veterans. J. Nurs. Scholarsh. 39 (4), 358–362.
Fletcher, C.E., Copeland, L.A., Lowery, J.C., Reeves, P.J., 2011. Nurse practitioners as primary care providers within the VA. Mil. Med. 176 (7), 791–797.
Gould, O.N., Johnstone, D., Wasylkiw, L., 2007. Nurse practitioners in Canada: beginnings, benefits, and barriers. J. Am. Acad. Nurse Pract. 19 (4), 165–171.
Hansen-Turton, T., Ritter, A., Begun, H., Berkowitz, S.L., Rothman, N., Valdez, B., 2006. Insurers' contracting policies on nurse practitioners as primary care providers: the current landscape and what needs to change. Policy Polit Nurs Pract 7 (3), 216–226.

Hansen-Turton, T., Ritter, A., Torgan, R., 2008. Insurers' contracting policies on nurse practitioners as primary care providers: two years later. Policy Polit. Nurs. Pract. 9 (4), 241–248.
Hansen-Turton, T., Ware, J., Bond, L., Doria, N., Cunningham, P., 2013. Are managed care organizations in the United States impeding the delivery of primary care by nurse practitioners? A 2012 update on managed care organization credentialing and reimbursement practices. Popul. Health Manag. 16 (5), 306–309.
Heale, R., James, S., Garceau, M.L., 2016. A multiple-case study in nurse practitioner-led clinics: an exploration of the quality of care for patients with multimorbidity. Nurs. Leadersh. 29 (3), 37–45.
HEE, 2017. Multi-professional Framework for Advanced Clinical Practice in England UK.
Hoffmann, T.C., Glasziou, P.P., Boutron, I., Milne, R., Perera, R., Moher, D., Altman, D.G., Barbour, V., Macdonald, H., Johnston, M., Lamb, S.E., Dixon–Woods, M., McCulloch, P., Wyatt, J.C., Chan, A.W., Michie, S., 2014. Better reporting of interventions: template for intervention description and replication (TIDieR) checklist and guide. BMJ 348, g1687.
Horrock, S., Anderson, E., Salisbury, C., 2002. Whether a nurse practitioner working in primary care can provide equivalent care to doctors. BMJ 324, 819–823.
ICN, 2002. Definition and Characteristics for Nurse Practitioner/Advanced Practice Nursing Roles. International Council of Nurses, Geneva.
ICN, 2018. International Council of Nurses (ICN) Nurse Practitioner/Advanced Practice Nursing Network: Definition and Characteristics of the Role: International AANP
Jakimowicz, M., Williams, D., Stankiewicz, G., 2017. A systematic review of experiences of advanced practice nursing in general practice. BMC Nurs. 16, 6.
Jarrell, L., 2016. Professional development and mentorship needs of nurse practitioners. J. Nurses Prof. Dev. 32 (1), 26–32.
Kaasalainen, S., Martin-Misener, R., Kilpatrick, K., Harbman, P., Bryant-Lukosius, D., Donald, F., Carter, N., DiCenso, A., 2010. A historical overview of the development of advanced practice nursing roles in Canada. Nurs. Leadersh. 23, 35–60 Spec No 2010.
Kraus, E., DuBois, J.M., 2017. Knowing your limits: a qualitative study of physician and nurse practitioner perspectives on NP independence in primary care. J. Gen. Intern. Med. 32 (3), 284–290.
Kuo, Y.F., Loresto Jr., F.L., Rounds, L.R., Goodwin, J.S., 2013. States with the least restrictive regulations experienced the largest increase in patients seen by nurse practitioners. Health Aff. (Millwood) 32 (7), 1236–1243.
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 Syst. Rev. 7 CD001271.
Lawton, R., McEachan, R.R., Giles, S.J., Sirriyeh, R., Watt, I.S., Wright, J., 2012. Development of an evidence-based framework of factors contributing to patient safety incidents in hospital settings: a systematic review. BMJ Qual. Saf. 21 (5), 369–380.
Levac, D., Colquhoun, H., O'Brien, K.K., 2010. Scoping studies: advancing the methodology. Implement. Sci. 5 (69), 1–9.
Lindblad, E., Hallman, E.B., Gillsjo, C., Lindblad, U., Fagerstrom, L., 2010. Experiences of the new role of advanced practice nurses in Swedish primary health care – a qualitative study. Int. J. Nurs. Pract. 16 (1), 69–74.
Ljungbeck, B., Sjogren Forss, K., 2017. Advanced nurse practitioners in municipal healthcare as a way to meet the growing healthcare needs of the frail elderly: a qualitative interview study with managers, doctors and specialist nurses. BMC Nurs. 16, 63.
MacDonald, J.M., 2005. Higher level practice in community nursing: part two. Nurs. Stand. 20 (10), 41–49.
Mackay, B., 2003. General practitioners' perceptions of the nurse practitioner role: an exploratory study. N. Z. Med. J. 116 (1170), U356.
Maier, C.B., Aiken, L.H., 2016. Task shifting from physicians to nurses in primary care in 39 countries: a cross-country comparative study. Eur. J. Public Health 26 (6), 927–934.
Main, R., Dunn, N., Kendall, K., 2007. 'Crossing professional boundaries': barriers to the integration of nurse practitioners in primary care. Educ. Prim. Care 18, 480–487.
Martin-Misener, R., Reilly, S.M., Vollman, A.R., 2010. Defining the role of primary health care nurse practitioners in rural Nova Scotia. Can. J. Nurs. Res. 42 (2), 30–47.
McKenna, L., Halcomb, E., Lane, R., Zwar, N., Russell, G., 2015. An investigation of barriers and enablers to advanced nursing roles in Australian general practice. Collegian 22 (2), 183–189.
Nasaif, H.A., 2012. Knowledge and attitudes of primary care physicians toward the nurse practitioner role in the kingdom of Bahrain. J. Am. Acad. Nurse Pract. 24 (3), 124–131.
Pace, R., Pluye, P., Bartlett, G., Macaulay, A.C., Salsberg, J., Jagosh, J., Seller, R., 2012. Testing the reliability and efficiency of the pilot mixed methods appraisal tool (MMAT) for systematic mixed studies review. Int. J. Nurs. Stud. 49 (1), 47–53.
Parker, R., Forrest, L., McCracken, J., McRae, I., Cox, D., 2014. What primary health–care services are Australian consumers willing to accept from nurse practitioners? A national survey. Health Expect 17 (5), 733–740.
Parker, R., Forrest, L., Ward, N., McCracken, J., Cox, D., Derrett, J., 2013. How acceptable are primary health care nurse practitioners to Australian consumers? Collegian 20 (1), 35–41.
Perry, C., Thurston, M., Killey, M., Miller, J., 2005. The nurse practitioner in primary care: alleviating problems of access? Br. J. Nurs. 14 (5), 255–259.
Petersen, P.A., Keller, T., Way, S.M., Borges, W.J., 2015. Autonomy and empowerment in advanced practice registered nurses: lessons from new Mexico. J. Am. Assoc. Nurse Pract. 27 (7), 363–370.
Petersen, P.A., Way, S.M., 2017. The role of physician oversight on advanced practice nurses' professional autonomy and empowerment. J. Am. Assoc. Nurse Pract. 29 (5), 272–281.
Petersen, P.A., Wray, S.M., 2012. Autonomy and Empowerment of Advanced Practice Nurses in New Mexico. New Mexico State University PhD.
Pittman, P., Masselink, L., Bade, L., Frogner, B., Ku, L., 2016. Factors determining medical staff configurations in community health centers: CEO perspectives. J. Healthc. Manag. 61 (5), 364–377.
Plager, K., Conger, M., 2006. Advanced practice nursing: constraints to role fulfillment. Internet J. Adv. Nurs. Pract. 9 (1), 1–10.
Pluye, P., Gagnon, M.P., Griffiths, F., Johnson-Lafleur, J., 2009. A scoring system for appraising mixed methods research, and concomitantly appraising qualitative, quantitative and mixed methods primary studies in mixed studies reviews. Int. J. Nurs. Stud. 46 (4), 529–546.
Poghosyan, L., Aiken, L.H., 2015. Maximizing nurse practitioners' contributions to primary care through organizational changes. J. Ambul. Care Manag. 38 (2), 109–117.
Poghosyan, L., Boyd, D.R., Clarke, S.P., 2016. Optimizing full scope of practice for nurse practitioners in primary care: a proposed conceptual model. Nurs. Outlook 64 (2), 146–155.
Poghosyan, L., Liu, J., 2016. Nurse practitioner autonomy and relationships with leadership affect teamwork in primary care practices: a cross-sectional survey. J. Gen. Intern. Med. 31 (7), 771–777.
Poghosyan, L., Liu, J., Shang, J., D'Aunno, T., 2017a. Practice environments and job satisfaction and turnover intentions of nurse practitioners: implications for primary care workforce capacity. Health Care Manag. Rev 42 (2), 162–171.
Poghosyan, L., Nannini, A., Smaldone, A., Clarke, S., O'Rourke, N.C., Rosato, B.G., Berkowitz, B., 2013a. Revisiting scope of practice facilitators and barriers for primary care nurse practitioners: a qualitative investigation. Policy Polit. Nurs. Pract. 14 (1), 6–15.
Poghosyan, L., Nannini, A., Stone, P.W., Smaldone, A., 2013b. Nurse practitioner organizational climate in primary care settings: implications for professional practice. J. Prof. Nurs. 29 (6), 338–349.
Poghosyan, L., Norful, A.A., Martsolf, G.R., 2017b. Organizational structures and outcomes of newly hired and experienced nurse practitioners in New York state. Nurs. Outlook 65 (5), 607–614.
Poghosyan, L., Norful, A.A., Martsolf, G.R., 2017c. Primary care nurse practitioner practice characteristics: barriers and opportunities for interprofessional teamwork. J. Ambul. Care Manag. 40 (1), 77–86.
Poghosyan, L., Shang, J., Liu, J., Poghosyan, H., Liu, N., Berkowitz, B., 2015. Nurse practitioners as primary care providers: creating favorable practice environments in New York state and Massachusetts. Health Care Manag. Rev. 40 (1), 46–55.
Price, A., Williams, A., 2003. Primary care nurse practitioners and the interface with secondary care: a qualitative study of referral practice. J. Interprof. Care 17 (3), 239–250.
Rashid, C., 2010. Benefits and limitations of nurses taking on aspects of the clinical role of doctors in primary care: integrative literature review. J. Adv. Nurs. 66 (8), 1658–1670.
RCN, 2018. Advanced Level Nursing Practice Section1: The registered Nurse Working At an Advanced Level of Practice. Royal College of Nursing, UK.
Richie, L., 2015. Pulling together: transforming urgent care for the people of scotland: the report of the independent review of primary care out-of-hours service.
Rigolosi, R., Salmond, S., 2014. The journey to independent nurse practitioner practice. J. Am. Assoc. Nurse Pract. 26 (12), 649–657.
Sangster-Gormley, E., Griffith, J., Schreiber, R., Borycki, E., Feddema, A., Thompson, J., 2015. Interprofessional collaboration: co-workers' perceptions of adding nurse practitioners to primary care teams. Qual. Prim. Care 23 (3), 122–126.
Sangster-Gormley, E., Martin-Misener, R., Downe-Wamboldt, B., Dicenso, A., 2011. Factors affecting nurse practitioner role implementation in Canadian practice settings: an integrative review. J. Adv. Nurs. 67 (6), 1178–1190.
Schadewaldt, V., McInnes, E., Hiller, J.E., Gardner, A., 2016. Experiences of nurse practitioners and medical practitioners working in collaborative practice models in primary healthcare in Australia – a multiple case study using mixed methods. BMC Fam. Pract. 17, 99.
Schadewaldt, V., McInnes, E., Hiller, J.E., Gardner, A., 2013. Views and experiences of nurse practitioners and medical practitioners with collaborative practice in primary health care - an integrative review. BMC Fam. Pract. 14, 132.
SG, 2017. Scottish Government (SG): Nursing 2030 Vision: Promoting Confident. Competent and Collaborative Nursing for Scotland, Edinburgh.
Sheer, B., Wong, F.K., 2008. The development of advanced nursing practice globally. J. Nurs. Scholarsh. 40 (3), 204–211.
Spetz, J., Skillman, S.M., Andrilla, C.H.A., 2017. Nurse practitioner autonomy and satisfaction in rural settings. Med. Care Res. Rev. 74 (2), 227–235.
Street, D., Cossman, J.S., 2010. Does familiarity breed respect? Physician attitudes toward nurse practitioners in a medically underserved state. J. Am. Acad. Nurse Pract. 22 (8), 431–439.
Sullivan-Bentz, M., Humbert, J., Cragg, B., Legault, F., Laflamme, C., Bailey, P.H., Doucette, S., 2010. Supporting primary health care nurse practitioners' transition to practice. Can. Fam. Phys. 56 (11), 1176–1182.
Tricco, A.C., Lillie, E., Zarin, W., O'Brien, K.K., Colquhoun, H., Levac, D., Moher, D., Peters, M.D.J., Horsley, T., Weeks, L., Hempel, S., Akl, E.A., Chang, C., McGowan, J.,

Stewart, L., Hartling, L., Aldcroft, A., Wilson, M.G., Garritty, C., Lewin, S., Godfrey, C.M., Macdonald, M.T., Langlois, E.V., Soares-Weiser, K., Moriarty, J., Clifford, T., Tuncalp, O., Straus, S.E., 2018. PRISMA extension for scoping reviews (PRISMA-ScR): checklist and explanation. Ann. Intern. Med 169 (7), 467–473.

Van Soeren, M., Hurlock-Chorostecki, C., Reeves, S., 2011. The role of nurse practitioners in hospital settings: implications for interprofessional practice. J. Interprof. Care 25 (4), 245–251.

Weiland, S.A., 2015. Understanding nurse practitioner autonomy. J. Am. Assoc. Nurse Pract. 27 (2), 95–104.

Wilson, A., Pearson, D., Hassey, A., 2002. Barriers to developing the nurse practitioner role in primary care-the GP perspective. Fam. Pract. 19 (6), 641–646.

Wilson, K., Coulon, L., Hillege, S., Swann, W., 2005. Nurse practitioners' experiences of working collaboratively with general practitioners and allied health professionals in New South Wales, Australia. Aust. J. Adv. Nurs. 23 (2), 22–27.

Xue, Y., Ye, Z., Brewer, C., Spetz, J., 2016. Impact of state nurse practitioner scope-of-practice regulation on health care delivery: systematic review. Nurs. Outlook 64 (1), 71–85.

Zapatka, S.A., Conelius, J., Edwards, J., Meyer, E., Brienza, R., 2014. Pioneering a primary care adult nurse practitioner interprofessional fellowship. J. Nurse Pract. 10 (6), 378–386.

Zug, K.E., Cassiani, S.H., Pulcini, J., Garcia, A.B., Aguirre-Boza, F., Park, J., 2016. Advanced practice nursing in Latin America and the Caribbean: regulation, education and practice. Rev. Lat. Am. Enfermagem 24, e2807.