Post-graduate Integration Programs for Recently Graduated Nurse Practitioners: A Rapid Review

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Introduction

The most recent data from the American Association of Nurse Practitioners (AANP, 2022) shows that over 325,000 nurse practitioners (NPs) were licensed in the United States in 2020. In Canada, there were 6,661 NPs licensed to practise; in the United Kingdom, 3,672; and in the Netherlands, 3,300 (Canadian Institute for Health Information, 2020; International Council of Nurses [ICN], 2020). In 2020, the NP role experienced the largest growth internationally when compared with other regulated nursing roles and professions. This growth highlights the need for and relevance of NPs on a global scale (ICN, 2020).

Nurse practitioners have a graduate-level education and an advanced nursing practice focused on the clinical and psychosocial care of patients, families, and communities. In addition to their clinical role, NPs identify and lead quality improvement and research initiatives, offer consultation to other health care professionals, and provide leadership in the development of policies impacting the determinants of health (Canadian Nurses Association, 2019; ICN, 2020). Empirical data identify significant associations between the NP practice and positive outcomes for patients, families, interprofessional teams, and health care organizations (Audet et al., 2021; Kleinpell et al., 2019; Smigorowsky, 2019; Yang et al., 2021). Specifically, NPs have been associated with higher health-related quality of life for patients, shorter hospital stays, lower rates of hospital readmission, and lower health care costs (Audet et al., 2021; Kleinpell et al., 2019; Smigorowsky, 2019; Yang et al., 2021). Recent studies also suggest that NPs enhance the communication and collaboration among interprofessional teams and strengthen continuity of care (Audet et al., 2021; Kleinpell et al., 2019; Smigorowsky, 2019; Yang et al., 2021). Accordingly, there is consensus in the literature regarding the importance and relevance of the NP role within interprofessional teams and health care organizations (AANP, 2022; ICN, 2020).

Background

It is well documented that recently graduated NPs face numerous challenges when transitioning to clinical practice (Barnes, 2015; Faraz, 2016, 2017). While the academic training of NP students, in particular those in acute adult and pediatric care specialties, covers a range of sub-specialties (e.g., cardiology, nephrology, neurology), none of these is covered in great depth. Accordingly, NPs graduate as acute care generalists but are hired into specific sub-specialties. When entering the workforce in sub-specialty practice, these NPs feel ill-prepared and often overwhelmed (Jangland et al., 2016). Accordingly, recently graduated NPs report feeling a lack of confidence when integrating into the interprofessional team, when collaborating with medical counterparts, and when managing their patient caseloads (Jangland et al., 2016). To facilitate their transition into practice, research teams, academic institutions, and health care organizations have developed and implemented postgraduate professional integration programs aimed at supporting NPs' transition into clinical practice (Bryant-Lukosius, 2015; Bryant & Parker, 2020). These programs have focused on providing a structured learning environment, with additional training opportunities and mentoring, to prepare recently graduated NPs for the facets of their autonomous role (Bryant-Lukosius, 2015).

Postgraduate professional integration programs such as residency, fellowship, and transition-into-practice programs have been developed in several countries and settings such as critical care, hospital medicine, mental health, and primary care (Kesten et al., 2021; Sanchez, 2018; Sargent & Olmedo, 2013). These programs are designed to provide recently graduated NPs with structured guidance by mentors (e.g., senior NPs or physicians) within the clinical setting

(Kesten et al., 2021; Sanchez, 2018; Sargent & Olmedo, 2013). Postgraduate professional integration programs typically comprise both clinical and theoretical components and include activities such as clinical rounds, academic coursework, seminars, and evaluations (Kesten et al., 2021; Sanchez, 2018; Sargent & Olmedo, 2013).

In 2017, there were 31 residency and 37 fellowship programs in the United States for recently graduated NPs. As of 2022, over 200 residency programs were available, including primary and specialty care, thus showing the high demand for these programs by health care organizations and recently graduated NPs (Kaplan et al., 2022). The authors found only one documented fellowship program in Canada currently available for recently graduated NPs. The Complex Malignant Hematology fellowship program at Hamilton Health Sciences in Hamilton (Ontario) aims to provide in-depth knowledge and skills to recently graduated NPs in the treatment and care of patients with a diagnosis of leukemia, lymphoma, aplastic anemia, or multiple myeloma (Hamilton Health Sciences, 2020). Postgraduate professional integration programs such as residencies and fellowships are characterized by the significant number of clinical hours they offer to recently graduated NPs, compared to certification and other types of programs. These programs are implemented within health care centres, and most of the curriculum is dedicated to integrating trainees within interprofessional teams and managing a caseload of patients with the support of a mentor (Kesten et al., 2021; Sanchez, 2018; Sargent & Olmedo, 2013).

Recent studies have identified the benefits of these programs for health care organizations, interprofessional teams, and recently graduated NPs (Hande et al., 2022; Sanchez, 2018). These benefits include a reduction in patient care costs, a stronger relationship between NPs and physicians, and higher levels of confidence among recently graduated NPs (Hande et al., 2022; Sanchez, 2018). To explain these associations, the authors proposed that such programs allow recently graduated NPs to gain in-depth skills and knowledge within a specific setting and increase their productivity, leading to benefits for patients, interprofessional teams, and health care organizations (Hande et al., 2022).

Setting

In Quebec (Canada), the training of acute care NPs has been through several modifications since the role was introduced in the province in 2006. Between 2006 and 2016, the master's level training of acute care NPs was a 2-year program narrowed to a specific specialty, including cardiology, nephrology, and neonatology. Within each program, the curriculum was solely focused on that specialty, leading recently graduated NPs to gain in-depth knowledge and become experts in a specific specialty (*Association des infirmières praticiennes spécialisées du Québec*, 2019). In 2017, the academic training of acute care NPs changed to more closely align the curriculum with the training of acute care NPs elsewhere in North America. The program was still based on a master's degree and a length of 2 years; however, the specific specialties were merged to create a single acute care program. The acute care program has been running since 2017 and is based on a wide curriculum in which the graduate students experience several specialties and acquire generalist training (e.g., cardiology, internal medicine) (*Ordre des infirmières et infirmiers du Québec*, 2023).

Modifying the training of acute care NPs had an important impact on the transition to practice of recently graduated NPs. Before 2017, recently graduated NPs found positions in an environment within their specific specialty. Today, recently graduated NPs are acquiring positions in a specific environment, but they have generalist training, which is not focused on a specific

specialty. For several years, this gap has led recently graduated NPs to experience challenges when transitioning to an autonomous practice, including a lack of skills and knowledge within a specific specialty and difficulty integrating into interprofessional teams. Interprofessional teams are also facing challenges when welcoming recently graduated NPs into their clinical units, such as longer preparation to compensate for the gap between academic education and bedside practice and dissatisfaction with the recently graduated NPs' productivity.

Recently graduated NPs have voiced their need for additional preparation to develop in-depth knowledge and skills tailored to the specialty in which they are hired and facilitate their transition into practice. Interprofessional teams and managers have also expressed their need for additional resources to support recently graduated NPs within their host environment and strengthen their readiness for an autonomous practice. In response, a provincial committee composed of clinicians and managers was created to assess the necessity of developing a postgraduate professional integration program for recently graduated NPs to facilitate their transition to practice in Quebec. Consequently, a review of the literature was first needed to inform the provincial committee of the current literature on postgraduate professional integration programs, describe the characteristics of these programs (e.g., structure, curriculum), and examine how the programs were evaluated (e.g., satisfaction, retention).

Therefore, our team had the mandate to conduct a review of the literature to identify postgraduate professional programs for recently graduated NPs and to present how these programs are evaluated. The current literature describing and evaluating these postgraduate professional integration programs remains limited, since several of these programs are still in development and pilot-testing phases (Faraz, 2016; Sciacca & Reville, 2016). At present, no literature synthesis has been conducted on the evaluation of the existing postgraduate professional integration programs for recently graduated NPs (Faraz, 2016; Sciacca & Reville, 2016).

Research Question

What is the current state of the literature focusing on postgraduate professional integration programs for recently graduated NPs and how have these programs have been evaluated?

Method

Design

A rapid review was undertaken following the guidelines of the *Rapid Review Guidebook* from McMaster University (Dobbins, 2017). Rapid reviews are a form of knowledge synthesis used to systematically identify research evidence and appraise, synthesize, and apply the evidence to the practice setting when time is limited (Dobbins, 2017). In Quebec, the number of recently graduated NPs is growing rapidly, leading to an increasing need for an effective way to facilitate their transition into practice. Accordingly, in December 2022 a provincial committee was struck to examine models of NP practice integration. As a first step, the committee sought to identify the current literature on postgraduate professional integration programs. The authors were mandated to undertake this work within a designated timeframe, thus supporting the decision to conduct a rapid review. Furthermore, internationally, the difficult transition into practice has been a significant challenge for many recently graduated NPs, leading to burnout or leaving the profession (i.e., the resignation of their position at the hospital and reorientation of their career elsewhere) for some of these NPs (Barnes, 2015; Faraz, 2016, 2017). Currently, health care centres and nursing associations around the world are assessing several avenues to address this challenge and facilitate

the transition into practice of recently graduated NPs (Kesten et al., 2021; Sanchez, 2018; Sargent & Olmedo, 2013). In the upcoming years, the number of NPs will continue to increase internationally, and more recently graduated NPs will start practising in health care centres. It is therefore important to promptly identify whether postgraduate programs are beneficial and worthy of further development and implementation, and provide literature to support health care organizations in developing such programs. Finally, a rapid review of the literature is the first step towards assessing the feasibility of conducting future systematic reviews and meta-analyses.

Eligibility Criteria

French and English studies were included if they focused on a postgraduate professional integration program dedicated to licensed NPs who graduated from a master's or doctoral program. All types of postgraduate professional integration programs (e.g., residency programs, fellowships, sub-specializations), settings (e.g., primary care, acute care, critical care), and studies (e.g., randomized controlled trials, pilot studies) were included. All types of evaluation were included. Evaluation related to patients, interprofessional teams, health care organizations, cost, and recently graduated NPs were included. Given the limited literature available on this topic, no limits related to the year of publication and geographical location were applied. All types of publications were included (e.g., published articles, conference abstracts, theses). For conference abstracts, the authors were contacted to ask whether a full publication was available. Programs published in peer-reviewed journals and programs identified through the grey literature or websites of health care associations and nursing associations were also included.

Studies were excluded if they focused on programs delivered in the context of the NP's academic (master's or doctoral) work. Programs focusing on nursing roles other than the NP role (e.g., registered nurse, clinical nurse specialist) were also excluded. Table 1 summarizes the inclusion and exclusion criteria.

Table 1

Inclusion and Exclusion Criteria

	Inclusion	Exclusion
Population	Recently graduated NP	Clinical nurse specialist
		Advanced practice nurse without an NP license
		Physician assistant
		Registered nurse
		Licensed practical nurse
Intervention	NP post-graduate professional integration program	NP academic program (e.g., NP master's program, NP doctoral program)
	NP orientation	
	NP residency	
	NP transition-to-practice program	
	NP clinical program	
	NP fellowship	
	NP specialization	
	NP sub-specialization	

Comparison	NP who did not complete a postgraduate professional integration program	No exclusion criteria applicable
Outcome	Program evaluation	No exclusion criteria applicable
	Patient-related outcomes	
	Interprofessional teams-related outcomes	
	Organizational outcomes	
	Cost effectiveness	
	Perspective of NP participants and other health care professionals	
	Competency development	
Study type	Randomized controlled trials	No exclusion criteria applicable
	Quasi-experimental studies	
	Longitudinal studies	
	Development and intervention pilot studies	
	Qualitative studies	
	Cost analysis	
Publication type	Published article	Editorial letter
	Conference abstract	Discussion paper
	Thesis	Knowledge synthesis
	Report (e.g., nursing association, health care organization)	

Search Strategy

A search in the CINAHL database was conducted in December 2021. Based on the guidelines for rapid review design (Dobbins, 2017), a first search in CINAHL was run to assess the number and quality of records yielded. A wide range and variety of records were retrieved in CINAHL, which prompted a decision not to search in other databases (Dobbins, 2017). Records were exported using EndNote software, and duplicates were removed following the method of Bramer et al. (2016). The reference lists of included studies were screened to identify additional relevant articles. A search in the grey literature was conducted, including websites of NP associations and health care centres. An academic librarian collaborated with our team to develop and conduct the search.

Study Selection

Records yielded by the search in CINAHL were imported into the RAYYAN software (Ouzzani et al., 2016). Titles, abstracts, and full texts were screened by the first author. Questions and uncertainties of the first author encountered during the screening process were addressed and discussed among all team members until a consensus was reached.

Quality Appraisal

The quality of the description of the included programs was assessed by the first author. Though not required, this quality appraisal was conducted to support our analysis. The quality of the intervention description is known to have an impact on its findings (Hoffmann et al., 2014). The Template for Intervention Description and Replication (TIDieR) guidelines were used to assess the quality of the description of the postgraduate professional integration programs in the included studies (see Appendix B) (Hoffmann et al., 2014). These guidelines were selected based on their focus on the description and replication of interventions (Hoffmann et al., 2014). Items 9, 10, 11, and 12 of TIDieR focus on tailored intervention, modification of the intervention during administration, and fidelity and adherence by participants to the intervention. These items were not applicable for postgraduate professional integration programs and were not assessed by our team during the quality appraisal process.
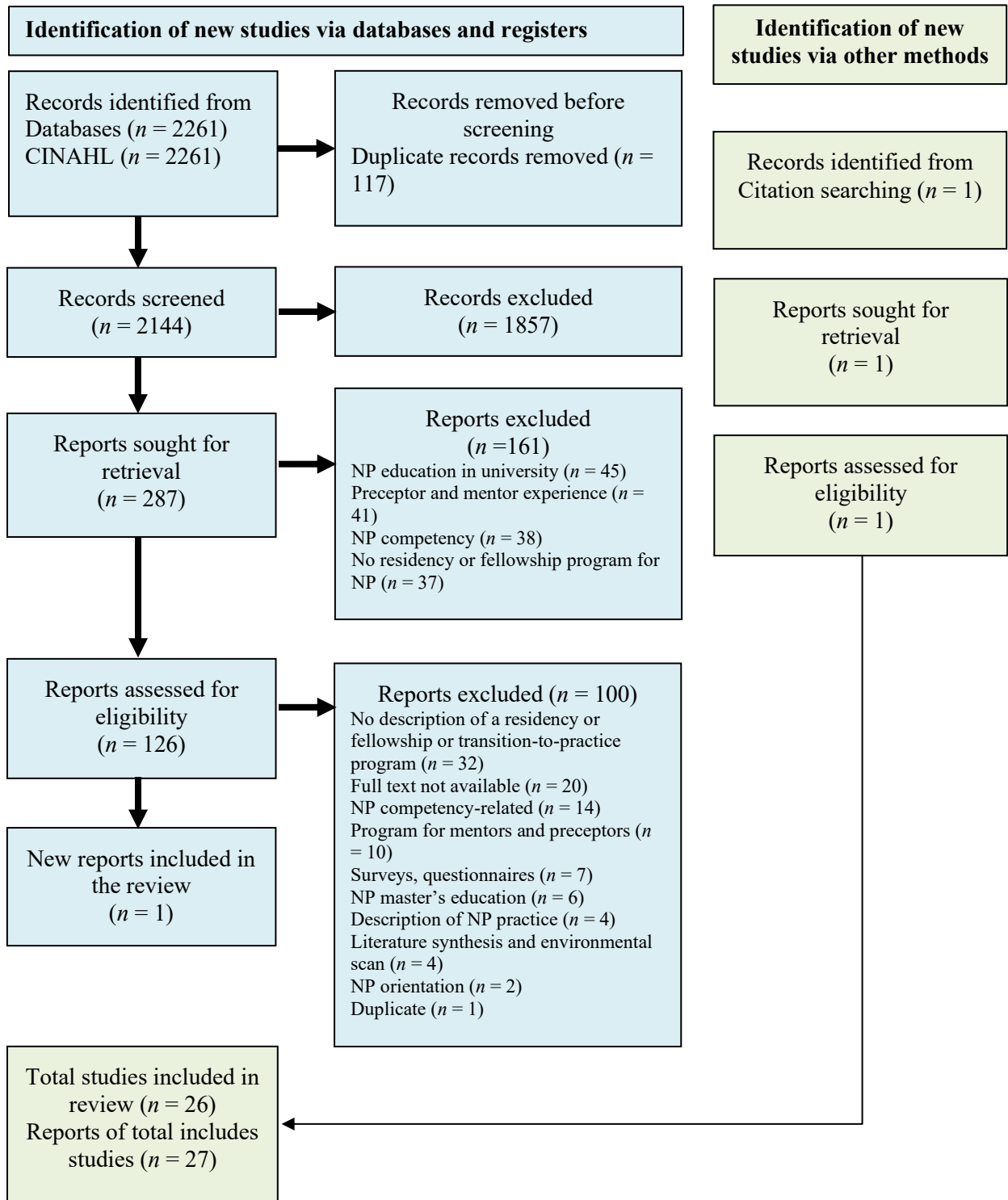
Data Extraction and Synthesis

Data were extracted and synthesized by the first author. The following data were extracted: (a) type of program, (b) first author and year of publication, (c) study design, (d) country, (e) setting and sample, (f) length of the program, (g) structure of the program and curriculum, and (h) evaluation of the program. A narrative synthesis of the findings was conducted following the *Rapid Review Guidebook* of McMaster University (Dobbins, 2017). Discussions among all team members were held to analyze and synthesize the findings.

Results

Study Characteristics

Among the 2,261 records yielded by the electronic search, 27 studies of 26 postgraduate professional integration programs were included in this review (Figure 1). A total of 25 of the included studies focused on unique programs, and two of the included studies focused on the same program. All included studies were retrieved from peer-reviewed publications, and no studies were found within the grey literature (Figure 1). Among the 27 studies included, 25 were published articles in a peer-reviewed journal, one was a conference abstract, and one was a doctoral thesis. Most of the screened records were excluded because they focused on (a) NP graduate education and scholarly work, (b) programs and interventions for preceptors and mentors, or (c) NP competencies and role enactment (Figure 1). Appendix A presents a summary of the characteristics of the included studies. Studies were published between 1998 and 2021, with 17 of the studies published after 2018 (Appendix A). Of the 26 postgraduate professional integration programs included, 13 were residency programs, nine were fellowship programs, and four were transition-to-practice programs (Appendix A). A total of 25 postgraduate professional integration programs were from the United States and one program was from the United Kingdom (Appendix A).

Figure 1
PRISMA Diagram

Identification of new studies via databases and registers

Records identified from Databases (*n* = 2261) CINAHL (*n* = 2261)

→ Records removed before screening Duplicate records removed (*n* = 117)

Records screened (*n* = 2144)

→ Records excluded (*n* = 1857)

Reports sought for retrieval (*n* = 287)

→ Reports excluded (*n* =161)
NP education in university (*n* = 45)
Preceptor and mentor experience (*n* = 41)
NP competency (*n* = 38)
No residency or fellowship program for NP (*n* = 37)

Reports assessed for eligibility (*n* = 126)

→ Reports excluded (*n* = 100)
No description of a residency or fellowship or transition-to-practice program (*n* = 32)
Full text not available (*n* = 20)
NP competency-related (*n* = 14)
Program for mentors and preceptors (*n* = 10)
Surveys, questionnaires (*n* = 7)
NP master's education (*n* = 6)
Description of NP practice (*n* = 4)
Literature synthesis and environmental scan (*n* = 4)
NP orientation (*n* = 2)
Duplicate (*n* = 1)

New reports included in the review (*n* = 1)

Total studies included in review (*n* = 26)
Reports of total includes studies (*n* = 27)

Identification of new studies via other methods

Records identified from Citation searching (*n* = 1)

Reports sought for retrieval (*n* = 1)

Reports assessed for eligibility (*n* = 1)

Study Designs

Nine studies used a descriptive design and described the development, implementation, and evaluation of their programs (Appendix A). Evaluation and outcomes related to the program were described without information regarding the methods underlying the evaluation of the program. Seven studies used a cross-sectional design. Most of these studies were based on self-administered surveys completed by NPs who successfully finished the program, mentors, physicians, and managers. Five studies used a longitudinal design, where programs were evaluated at several time points over 12 to 24 months (Appendix A). Two studies used a qualitative descriptive design, involving interviews conducted with recently graduated NPs who had successfully completed the program (Appendix A). One study used a case-control design, another used a pre-post design, and a final study used a pilot-test design (Appendix A).

Settings

Six postgraduate professional integration programs were conducted in primary care settings (Appendix A). Two programs were conducted in mental health and psychiatry settings. Two programs were conducted in each of the emergency departments, hospital medicine, and pediatric settings. One program was conducted in primary and mental health care (Appendix A). The remaining 11 programs were conducted in various settings, including geriatrics/elder adult care, neurocritical care, neurology, rheumatology, urology, oncology, rural facilities, acute care, trauma and critical care, dermatology, and retail health clinic (Appendix A).

Participants

A total of 18 postgraduate professional integration programs mentioned the number of NPs enrolled in the programs (Appendix A). Thirteen programs specified the number of NPs enrolled in their programs per year, with an average of five NPs per year per program and ranging from two NPs per year to 24 NPs per year. Five programs mentioned the total number of NPs who successfully completed their programs over a specified number of years, ranging from 17 NPs (over 3 years) to 108 NPs (over 10 years) (Appendix A).

Length of the Programs

On average, the postgraduate professional integration programs lasted 10 months and ranged from 1 month to 36 months (Appendix A). Sixteen programs were 12 months long, and four programs were 24 months and longer. Two programs had a duration of 1 month, one program of 6 months, and one program lasted 7 months. All other programs were 12 months and longer (Appendix A).

Quality Appraisal

Most of the programs met many of the components of the TIDieR checklist (Appendix B). Each program description was assessed and assigned a 1 (if the description included the required information) or a 0 (if the required information was missing). All studies described the procedures and activities included in their postgraduate professional integration programs. All studies, except one, provided a rationale to support the need for a postgraduate professional integration program for recently graduated NPs and described the mode of delivery and functioning of the program (Appendix B). In addition, only a few studies provided the material and documentation used for their programs. Only a few studies described the background of the program providers, the specific education given to the providers for the delivery of the program, and the tasks and activities performed by the providers (Appendix B).

Types of Programs

Three types of postgraduate professional integration programs were identified. Thirteen studies described residency programs, nine studies described fellowship programs, and four studies described transition-to-practice programs (Appendix A).

Residency Programs

The aim of the residency programs included in this review was to give participants experience within a wide range of specialties throughout a 12-month period. For example, one residency program within an acute care setting included rotations in cardiology, nephrology, and internal medicine, among others. Residents participated in several rotations and modules and were integrated into the interprofessional teams of each of the specialties through which they rotated. Within each specialty, the residents participated in giving care to patients and in joint medical rounds, and they collaborated with the medical team, the nursing team, and other health care professionals. Residency programs also included important academic components such as courses (e.g., advanced pharmacotherapy, advanced arrhythmias), clinical case presentations with a mentor, written and oral examinations, conferences, competency achievement portfolios, and monthly meetings with an evaluation committee.

Fellowship Programs

The aim of fellowship programs included in this review was to develop the competencies, skills, and learning of recently graduated NPs within one specific area. The duration of these programs was on average 1 year. Throughout the fellowship, fellows practised within one specialty (e.g., pediatric) and rotated through subspecialties (e.g., pediatric intensive care unit, pediatric clinics). Fellowship programs consisted of rounds and learning modules in which fellows had the opportunity to gain experience in the specialty. Fellows were matched with a physician and were integrated within the physician's team (i.e., fellows and physicians were matched for the entire length of the program). Fellows attended journal club sessions, guest speaker conferences, and seminars. Fellows also participated in research projects conducted by the physicians with whom they were partnered. Fellowship programs included an evaluative component in which the physicians who were matched with the fellows assessed the fellow's skills, knowledge, and progression. The evaluations included portfolios filed by the fellows and their matched physicians (e.g., clinical activities performed autonomously by the fellow in the last month) and checklists of targeted objectives to complete throughout the program (e.g., being able to insert a thoracic drain after 6 months spent at the ICU).

Transition-to-Practice Programs

The transition-to-practice programs included in this review focused mainly on the mentorship of recently graduated NPs. These programs were undertaken within a single setting, and their lengths ranged from several months up to 2 years. Within the program, the mentors taught, supported, and assisted the recently graduated NPs in providing care to patients and families. Mentors were pre-selected by the managing committees of the programs based on their pedagogical skills, their availability, and their clinical background. Mentors meeting these criteria were approached by the managing committees and recruited as mentors only if they agreed to participate in the programs. Most of the mentors were senior NPs and physicians with extensive experience within the host environment. The recently graduated NPs learned from the mentor's own experience and knowledge and worked alongside the mentor. These programs also included

monthly guest speakers that covered topics related to clinical practice or organization and management of care. The recently graduated NPs were evaluated throughout the program through written and oral examinations, case analyses, and skills demonstrations.

Evaluation of the Programs

The postgraduate professional integration programs were evaluated on five types of outcomes: (a) enhancement of NPs' competencies, skills, productivity, and confidence; (b) employment of NPs after the completion of the program; (c) satisfaction of recently graduated NPs, mentors, and managers; (d) successful completion of the program by recently graduated NPs; and (e) cost. Table 2 presents a summary of these outcomes.

Table 2

Summary of Program Evaluation

Type of evaluation	Description	Studies (first author, year of publication)
Enhancement of NPs' competencies, skills, productivity, and confidence	Skills and competencies included diagnostic skills, capacity to undertake clinical interventions (e.g., insertion of drains, intravenous catheters), and interpretation of X-rays and laboratory results. Productivity included the speed of care, the number of patients seen in 1 day, the relative value per unit (e.g., monetary value of the quantity of interventions billed by the physician), and the number of interventions billed by the NP. Confidence was measured by self-assessment and focused on abilities, clinical skills, and readiness to practise independently.	$n = 9$ Transition to practice ($n = 2$): Dowling Evans, 2017 Erickson, 2021 Fellowship ($n = 4$): Alencar, 2018 Comola, 2021 Furfari, 2014 Wojner Alexandrov, 2009 Residency ($n = 3$): Ayvazian, 2021 Thabault, 2015 Writz Rugen, 2018
Employment	Capacity of recently graduated NPs to be hired into a full-time position within the health care centre where they completed the program or elsewhere.	$n = 8$ Transition to practice ($n = 2$): Dowling Evans, 2017 Erickson, 2021 Fellowship ($n = 2$): Caldwell, 2019 Frissora, 2021 Residency ($n = 4$): Barnacle, 2021 McGuiness, 2020 Painter, 2019 Thabault, 2015
Satisfaction	Satisfaction of NPs who completed the program, mentors, physicians, and managers with the learning, skills, and competencies gained within the program. Satisfaction regarding the structure, organization, and content of the program by the recently graduated NPs, mentors, physicians, and/or managers.	$n = 8$ Transition to practice ($n = 0$): Fellowship ($n = 2$): Alencar, 2018 Wojner Alexandrov, 2009

		Residency (n = 6):
		Barnacle, 2021
		Gaudio, 2018
		Goudreau, 2011
		Hollinger-Smith, 1998
		Hood, 2019
		McGuiness, 2020
		Painter, 2019
Completion of the program	Program completion rates (number of NPs who successfully completed the program as a proportion of those enrolled).	n = 3
		Transition to practice (n = 0):
		Fellowship (n = 3):
		Caldwell, 2019
		Furfari, 2014
		Lackner, 2019
		Residency (n = 0):
Cost	Cost-effectiveness of the program measured as the difference between program costs and savings attributable to program outcomes.	n = 3
		Transition to practice (n = 1):
		Erickson, 2021
		Fellowship (n = 1):
		Lackner, 2019
		Residency (n = 1):
		McGuiness, 2020

Enhancement of NPs' Competencies, Skills, Productivity, and Confidence

Nine studies (Alencar et al., 2018; Alexandrov et al., 2009; Ayvazian et al., 2021; G. Comola, 2021; Dowling Evans et al., 2017; Erickson et al., 2021; Furfari et al., 2014; Rugen et al., 2018; Thabault et al., 2015) focused on the development of competencies, skills, productivity, and confidence by recently graduated NPs, including five fellowship, three residency, and two transition-to-practice programs. All these studies reported perspectives they collected through self-administered questionnaires or interviews with program participants. Skills and competencies reported to have been developed included diagnostic skills, capacity to undertake specific clinical procedures (e.g., installation of drains, intravenous catheters), and interpretation of X-rays and laboratory results. Productivity was measured by the speed of care, the number of patients seen in 1 day, the relative value unit (i.e., monetary value of the intervention billed by the physician), and the number of interventions billed by the recently graduated NPs. Confidence was measured through self-assessment and focused on abilities, clinical skills, and readiness to practise independently. All studies reported an increase in the development of competencies, skills, productivity, and confidence of program participants, after 1, 6, and 12 months. One study reported the perception of the physicians working with the recently graduated NPs and suggested that after the completion of the postgraduate professional integration program, NPs had improved their knowledge, clinical competencies, and clinical skills (see Appendix A and Table 2).

Employment of NPs

Eight studies (Barnacle et al., 2021; Caldwell et al., 2019; Dowling Evans et al., 2017; Erickson et al., 2021; Frissora & Ranz, 2021; McGuinness et al., 2020; Painter et al., 2019; Thabault et al., 2015) assessed the retention of recently graduated NPs after completing the postgraduate professional integration program, including four residency, two fellowship, and two transition-to-practice programs. Six studies out of eight reported employment rates within the host health care centres after NPs completed their programs. Four of these six studies reported that 100% of their trainee NPs transitioned into permanent positions after completing their programs. Of note, one of the programs (Caldwell et al., 2019) involved a 2-year mandatory contract within the organization for NPs enrolled in the program. Three studies out of eight reported that all NPs who completed their postgraduate professional integration programs in a specific specialty (e.g., ER, primary care) were given a permanent position within that specialty (see Appendix A and Table 2).

Satisfaction

Nine studies (Alencar et al., 2018; Alexandrov et al., 2009; Barnacle et al., 2021; Gaudio & Borensztein, 2018; Goudreau et al., 2011; Hollinger-Smith & Murphy, 1998; Hood et al., 2019; McGuinness et al., 2020; Painter et al., 2019) examined satisfaction with their programs, including six residency and two fellowship programs. All studies focused on the satisfaction of trainees, finding that the NPs who successfully completed the programs were highly satisfied. The satisfaction of NPs was attributed to several activities and learning opportunities during the program, including one-on-one time with mentors, time dedicated for readings and advanced coursework, and support from their organization with their transition to practice (e.g., frequent meetings with the nurse manager, equipment provided to facilitate their care). NPs were also satisfied with the skills, competencies, knowledge, and confidence in their practice that they gained through the program.

Four studies examined the satisfaction of managers and administrators of the program. All four studies reported high satisfaction among managers and administrators. This satisfaction was related to the higher productivity of the NPs, their retention within the health care organization, and cost savings associated with their care. Two studies examined the satisfaction of physicians working with NP trainees. These studies found that physicians were satisfied with the program. Physicians expressed a higher confidence in the NPs' skills and knowledge, higher satisfaction with the NPs' degree of autonomy, and a closer relationship between NPs and physicians during and after the completion of the program (see Appendix A and Table 2).

Completion of the Program

Three studies (Caldwell et al., 2019; Furfari et al., 2014; Lackner et al., 2019) reported on the number of trainees who completed their fellowship programs. Two of these studies reported that, in the first year of implementation eight NPs for the first study and two NPs for the second study successfully completed the program. These studies did not report completion rates. However, the third study reported a completion rate of 83% (10/12) in the first year of the program (see Appendix A and Table 2).

Cost

Three studies (Erickson et al., 2021; Lackner et al., 2019; McGuinness et al., 2020) evaluated the cost savings associated with their programs, including one transition-to-practice, one

fellowship, and one residency program. All studies found that the implementation of the program led to cost savings for the health care organization hosting the program. Cost analyses were based on the difference between the cost needed to hire mentors and pay trainees, and the savings associated with the NPs' clinical practice following the preparation. These savings emanate from a decrease in physician caseloads, a decrease in physician medication and test prescriptions, a decrease in interventions performed and billed by physicians, and a greater number of patients taken charge of by the interprofessional team per day (see Appendix A and Table 2).

No Evaluation Reported

Four studies (Keefe Marcoux et al., 2019; Kilgore, 2019; Langley et al., 2018; Shelby, 2008) provided a description of their programs but did not report any evaluation. The authors of these studies were not able to conduct an evaluation of their programs based on important implementation and methodological limitations: (a) the program was a pilot test, (b) the sample size of the recruited NPs within the program was small (e.g., one or two NPs recruited), or (c) validated tools to measure the efficacy of the program were not used (Appendix A).

Discussion

The purpose of this paper is to present a rapid review of the literature that describes and evaluates postgraduate professional integration programs for recently graduated NPs and to answer a mandate given by a provincial committee in Quebec (Canada). Overall, 26 postgraduate professional integration programs were identified, including residency programs, fellowship programs, and transition-to-practice programs.

Assessment of the Evaluation of the Programs

Our rapid review was the first literature synthesis to include how postgraduate professional integration programs were evaluated and the results of these evaluations. Five types of outcomes were identified. All the evaluations of the programs were positive, which highlights the importance and benefits of postgraduate professional integration programs for recently graduated NPs. Outcomes related to the competencies, skills, productivity, and confidence of recently graduated NPs were the most frequently evaluated, which is not surprising considering that postgraduate professional integration programs targeted primarily the enhancement and development of recently graduated NPs' skills, competencies, knowledge, and autonomous practice. These findings are align with the recent review conducted by Sciacca and Reville (2016) examining the evaluation measures used within fellowship and residency programs for recently graduated NPs. These authors retrieved six types of evaluation measures: self-assessment, competency measures, portfolio of the clinical achievements, mentoring, simulation-based learning, and written evaluation. All these evaluation measures focused on clinical confidence and the evaluation of competencies, skills, and knowledge of the recently graduated NPs (Sciacca & Reville, 2016). Indeed, enhancing and supporting competencies, knowledge, skills, autonomous practice, and confidence are the key components to ensure a positive and efficient transition into practice of recently graduated NPs (Sciacca & Reville, 2016). The satisfaction of recently graduated NPs, physicians, and managers was also frequently retrieved by our review.

Most of the programs were in their development or pilot-testing phase; thus, it was important to assess if these programs answered the needs of the recently graduated NPs, as well as physicians and managers. Examining satisfaction within the early stage of the development was crucial to ensure an upcoming implementation and acceptance of the postgraduate professional

programs (Alencar et al., 2018; Barnacle et al., 2021). Nonetheless, our team identified a high heterogeneity between the measures used to evaluate the retrieved programs. Most of the outcomes were measured from semi-structured interviews and self-administered questionnaires developed by the health care organizations or research teams managing the programs, and none of the self-administered questionnaires were validated under psychometric assessments. For example, nine studies focused on satisfaction of the recently graduated NPs after the completion of their programs. Across all studies, satisfaction was measured by the satisfaction of the learning skills, the competencies, the structure and organization of the programs, and the content taught during the programs. The definition and measure of satisfaction were heterogeneous between these studies, which precluded the possibility to compare the effectiveness of the programs with one another (Alencar et al., 2018; Alexandrov et al., 2009; Barnacle et al., 2021; Gaudio & Borensztein, 2018; Goudreau et al., 2011; Hollinger-Smith & Murphy, 1998; Hood et al., 2019; McGuinness et al., 2020; Painter et al., 2019).

Assessment of the Methods

All postgraduate professional integration programs retrieved were in their early development and/or pilot-testing stage. This is consistent with previous literature synthesis, highlighting the novelty of these programs at the international scale (Faraz, 2016; Harper et al., 2017; Martsolf et al., 2017; Sciacca & Reville, 2016; Speight et al., 2019; Whitehead et al., 2022). Past authors have drawn attention to the method underlying the development and evaluation of postgraduate professional integration programs for recently graduated NPs, which leads to difficulty in assessing the efficacy of those programs (Faraz, 2016; Harper et al., 2017; Martsolf et al., 2017; Sciacca & Reville, 2016; Speight et al., 2019; Whitehead et al., 2022).

Most of the studies retrieved by our review used descriptive or cross-sectional designs. While several studies provided an in-depth description of their program, such as the structure and curriculum, less attention was paid to the description of the method used to evaluate these programs. Our team identified three important methodological limitations related to the quantitative evaluation of postgraduate professional integration programs. First, several evaluations did not include a control group. The absence of control groups precludes the possibility of comparing the recently graduated NPs who completed postgraduate professional integration programs with those who did not. Second, several of the included studies had small sample sizes. For quantitative studies, the small sample sizes represent an important limitation, which potentially limits the validity and generalizability of the findings. Third, the evaluation of the programs was conducted during, or immediately after, the completion of those programs. Accordingly, the long-term effects of these programs have not yet been explored, which precludes the assessment of the sustainability of outcomes of these postgraduate professional integration programs.

This rapid review was the first step to assess the feasibility of conducting a future systematic review and meta-analysis. We purport that a systematic review and meta-analysis are not currently relevant, based on two important reasons. First, most of the time, systematic reviews require an extensive pool of literature to screen the literature based on a specific and narrow research question. Currently, the state of the literature on postgraduate professional programs for recently graduated NPs is novel and still in development, and only a small range of literature is available to measure and evaluate these programs. Second, the evaluations of the postgraduate professional programs retrieved by our team were highly heterogeneous. In addition, several evaluations were based on qualitative feedback (e.g., semi-structured interviews, and self-administered questionnaires based on open-ended questions). While these factors preclude the

relevance of a meta-analysis, a systematic review of qualitative findings may be relevant and might contribute to our understanding of the programs being evaluated. In the upcoming years and when the literature has grown and expanded, we believe that a future systematic review and meta-analysis will be relevant to evaluate the efficacy of postgraduate professional programs with specific and targeted outcomes.

Assessment of the Development of Programs

The development of postgraduate professional integration programs for recently graduated NPs does not come without its challenges and considerations. Two important challenges and considerations when developing postgraduate professional integration programs were identified by our team. First, several authors highlighted the difficulty in coordinating the multiple institutions and resources needed to build and run their programs (Alencar et al., 2018; Furfari et al., 2014; Goudreau et al., 2011; Hood et al., 2019; Langley et al., 2018; Messing et al., 2021). Several programs were composed of both an academic and a clinical component, thus requiring the involvement of universities and health care centres. Defining the scope, roles, and activities of each of these institutions was challenging. The recruitment and education of mentors was also identified as an important challenge, including the recruitment of different types of mentors (e.g., physicians, senior NPs, and managers) and the organization of the mentors' activities between their clinical practice and the preparation of the recently graduated NPs. One important challenge associated with the recruitment of mentors was the additional workload involved. Even if the mentors were compensated for their work, they were asked to fit the mentorship of trainees within their regular schedule. Second, the coordination and synchronization of the programs were challenging. Residency and fellowship programs were organized as rotations and modules within several specialties and settings. Authors indicated that the creation of a relevant rotation system that included clinical practice, coursework, and evaluation was complex because it needed the coordination of several managers, university faculty, and clinicians. Also, it was challenging to identify a coherent sequence between specialties for the rotations of trainees to ensure adequate scaffolding and levelling throughout the programs (Alencar et al., 2018; Furfari et al., 2014; Goudreau et al., 2011; Hood et al., 2019; Langley et al., 2018; Messing et al., 2021).

Assessment of the Cost

The funding required to develop and start postgraduate professional integration programs was an important challenge encountered by several authors (Alencar et al., 2018; Furfari et al., 2014; Goudreau et al., 2011; Hood et al., 2019; Keefe Marcoux et al., 2019; Lackner et al., 2019; Langley et al., 2018; Messing et al., 2021). Health care centres had to provide their own funding to launch these programs. Significant financial support was needed to create material, hire staff and coordinators, compensate mentors, and provide salaries to the recently graduated NPs enrolled in the programs. Throughout the length of the program, NPs' residents and fellows were provided with an annual salary (i.e., average salary range from US$65,000 to US$80,000 per year in the United States) and no tuition or expenses were imposed (Kaplan et al., 2022). In 2018, the Health Resources and Services Administration awarded 36 grants to health care organizations across the United States to develop postgraduate professional integration programs for recently graduated NPs (Kaplan et al., 2022). Currently, several health care organizations have applied for financial support from the federal government to get the resources needed to develop and implement those programs. On average, the latest data from the Health Resources and Services Administration (2020) suggest that creating one postgraduate professional program needs approximately

US$1 million (including both direct and indirect costs), including a ceiling amount of up to US$100,000 total costs per year per trainee.

In Canada, the Complex Malignant Hematology fellowship program of Hamilton Health Sciences needed $1.5 million to launch and was funded by private sponsors (Hamilton Health Sciences, 2020). To date, at the federal government level, no funding sources are available to financially support the creation of postgraduate professional programs for recently graduated NPs, which highlights the gap between the Canadian and American context. This gap can be partly explained by the significant difference of the annual number of recently graduated NPs in the United States and Canada, as well as the funds and resources available in both countries.

These numbers highlight the significant cost related to the development and implementation of postgraduate professional integration programs for recently graduated NPs. Nonetheless, some studies suggested that the long-term cost savings associated with the postgraduate professional integration program could offset the significant investment required for the program (Erickson et al., 2021; Lackner et al., 2019; McGuinness et al., 2020). To explain these associations, it was shown that after the completion of their programs, it is likely that recently graduated NPs will enroll in a full-time position at their host environment, decreasing the caseload of medical teams, reducing the interventions billed by physicians, creating higher patient turnover, and shortening the length of hospital stays (Erickson et al., 2021; Lackner et al., 2019; McGuinness et al., 2020).

Avenues for Future Research

We believe it is important that future research focus on three important avenues. First, the measurement of common outcomes across different postgraduate professional integration programs needs to be standardized. One avenue for future research is the development and validation of instruments to measure outcomes related to recently graduated NPs, interprofessional teams, and health care organizations. While postgraduate professional programs take place in different settings and across jurisdictions, we contend that validated instruments are needed to measure outcomes that can be generalized to a wide range of programs. We acknowledge that while the specificity of each program makes measuring standardize outcomes difficult, there exist outcomes that apply to a wide range of postgraduate professional programs; these include hospital costs, attrition, rate of completion, satisfaction with the program, and retention rate of recently graduated NPs, among others. Such an instrument will allow research teams and health care organizations to assess the sustainability, as well as the efficacy and performance of their programs compared with other programs across the country. Standardizing the measurement of outcomes is also a first step towards the development of future systematic reviews and meta-analyses, even if postgraduate professional programs are grounded within different settings (e.g., primary care, emergency department).

Second, quasi-experimental studies with control groups need to be considered. We believe that the inclusion of a control group will significantly strengthen the examination of the benefits of postgraduate integration professional programs by comparing recently graduated NPs who completed those programs with recently graduated NPs who did not. Based on feasibility and ethical considerations, quasi-experimental designs are better suited for evaluating postgraduate integration programs than are randomized controlled trials.

Finally, future studies using qualitative based approaches (e.g., Glaserian grounded theory, ethnography) are needed to further our understanding and exploration of the experience of recently

graduated NPs completing postgraduate professional programs. Such studies would expand our understanding of how these programs shape the practice of recently graduate NPs and support them in their transition to autonomous practitioners (e.g., increase the confidence of the trainees when giving care to patients, improve skills set).

Strengths and Limitations

This rapid review has important strengths and some limitations. This is the first review to examine the evaluation of postgraduate professional integration programs for recently graduated NPs. This review included a wide range of settings (e.g., emergency, primary care, and mental health), outcomes, and type of programs. Also, despite being a rapid review, the authors undertook a quality appraisal to assess and reflect on the quality of the description of the retrieved programs. In terms of the limitations that must be acknowledged, there is a risk that unsuccessful postgraduate professional integration programs were not the subject of published research, thus leading to a publication bias and an overestimation of the benefits of the postgraduate professional integration programs retrieved by our search of the literature. However, a search within the grey literature was conducted to retrieve programs published in non-peer-reviewed academic journals, and no additional programs were identified. Another limitation was that only one database was searched, thus some studies might have been missed. Nonetheless, the search strategy was developed and conducted in collaboration with an academic librarian and yielded numerous studies.

Conclusion

Some evidence supports the relevance and benefits of postgraduate professional integration programs for recently graduated NPs. Postgraduate professional integration programs have been associated with several positive outcomes, such as an increase in the confidence, skills, and satisfaction of recently graduated NPs. For health care organizations and managers, these programs have shown an increase in the productivity of recently graduated NPs, high employment rates, and lowered costs. Nonetheless, these findings must be interpreted with caution based on the methodological limitations of the current literature. Postgraduate professional integration programs are still in development and being pilot tested. In the upcoming years, programs will grow and enrollment will increase, which will allow future studies to use more robust methodologies. Future studies are needed to examine their benefits over the long term as programs grow. Postgraduate professional integration programs represent a promising avenue to support recently graduated NPs in their transition to independent practice, increasing their well-being and satisfaction with their clinical practice, and ultimately, enhancing the quality and safety of the care given to patients and families.

Declaration of Competing Interest

None.

Contributions

All authors contributed to developing the background and identifying the objectives. Author LAA conducted the search within the literature and screened the titles, abstracts, and full text. LAA assessed the methodological quality of the included studies. LAA wrote the first draft of the manuscript. Authors LAA, AG, and IS contributed to the narrative analysis of the data and the development and revision of the manuscript. All authors revised and approved the manuscript before submission.

Funding Sources

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Appendix A

Synthesis of the Included Studies

First author and year of publication	Study design	Country	Setting and sample	Program length	Program structure	Program evaluation
			Transition to practice			
Dowling Evans, 2017	Cross-sectional (survey)	United States	Setting: ER and related settings (prehospital care with paramedics, emergency psychiatry, toxicology, radiology, ophthalmology, orthopedic, trauma surgery, disaster management). Sample: 108 NP graduated from the program between 2004 and 2014.	1 month	Structure: Rotation pairs between EM resident and ENP. Rotations between the ER department and related acute care settings. Curriculum: Content includes trauma, critical care, management of urgent and life-threatening cardiovascular, neurological, gastrointestinal, obstetrical, ear, nose, throat, dental, orthopedic, and pediatric conditions. Skills include suturing, splinting, foreign body removal, incision, drainage, 12-lead ECG interpretation, emergency childbirth, radiography interpretation, chest thoracotomy and airway management (intubation).	90% of the NP who completed the program currently work or have worked in ED or urgent care settings. Positive NP feedback on the program and the feeling of an improvement of the NPs clinical skills and confidence in communication with physicians.
Erickson, 2021	Longitudinal (retrospective)	United States	Setting: primary care Sample: pilot of 8 recently graduated	12 months	Structure: Pairing between the NPs and mentors. Mentors and NPs meet weekly to address questions, assess patient	Increase of the engagement of NPs and PAs within their clinical setting from

			NP and PAs in August 2016		care, review charts, and identify goals.	14th percentile to the 50th percentile.
					Curriculum: The program is based on a tailored approach for each NP. NPs completes a self-assessment focused on clinical skills and knowledge needed in primary care settings. Tailored goals and objectives are identified between each NP and mentor for 3, 6, and 12 months.	Increase of the retention of NPs and PAs and decrease of turnover from 14.5% to 9%. Decrease of estimated cost for the health system annually. A 15% increase of productivity at 6 months and 11.5% at 12 months by NPs and PAs compared to before the program.
Kilgore, 2019	Descriptive qualitative	United Kingdom	Setting: geriatric, older adult Sample: not mentioned	24 months	Structure: Pairing between APN and mentors. The mentors' roles consist of coaching, mentorship, and assessment. A panel of nurse consultants follows each APN to assess the progress of the trainees within the program and conduct an annual evaluation. Curriculum: The program focuses on the care of older adults, including diagnosing, providing treatment, and monitoring improvement. The program focuses on the	No evaluation reported.

					development of critical thinking, learning, and processing of information, and the development of individualized care treatment and pathway for each patient.	
Langley, 2018	Pre-post study	United States	Setting: neurocritical care

Sample: 12 APPs completed the program between December 2014 and 2018 | 3 phases:
Phase 1: 2–4 weeks
Phase 2: 2–3 months
Phase 3: 2–3 months | Structure: Each APN is matched with a clinical partner. During each phase, the trainee is expected to follow coursework based on a structured study guide. The trainee also observes and participates gradually in the care given to patients by their clinical partner.

Curriculum: The curriculum is composed of learning knowledge and clinical skills from the neurocritical care environment, including triage, diagnosis, critical care management and thinking, and management of complex critical care patients. Applying techniques and interventions independently are expected, including central lines, PICC lines, arterial lines, and tracheal intubation. | No evaluation reported |

Fellowship

Alencar, 2018	Descriptive	United States	Setting: oncology Sample: not mentioned	50 weeks of clinical rotations and 8-12 weeks of specialty focus	Structure: The program includes coursework focused on hospital orientation, electronic chart records, chemotherapy, and oncology training. Clinical rotations and experience within clinical settings are also part of the program. Participation in quality development or research projects is expected. Curriculum: Advanced oncology knowledge and skills development through clinical practice, coursework, and research and developmental projects.	The NP, oncologist, and oncology leadership mentioned being satisfied with the program. The NP and managers also suggested there were improvements in patient care delivery by new NPs, increase of the NP skills, and higher job satisfaction of NPs.
Bowen, 2018	Cross-sectional (survey)	United States	Setting: pediatric (orthopedic, ear, nose, throat, general surgery, trauma, radiology) Sample: 12 APNs	12 months	Structure: The program was composed of 4-month specialty-clinic rotations, 8-month clinical practice in the ED, and specialty courses. Each fellow was paired with a clinical preceptor for the length of their training. Curriculum: Pediatric life support, basic life support, wound management and suturing, nitrous oxide administration, and procedural sedation.	Improvement of the orientation of NPs at the ED, the medical education of residents, and the overall organization of the unit and support for NPs.
Caldwell, 2018	Descriptive	United States	Setting: rheumatology	12 months	Structure: The program includes advanced rheumatology coursework	The two fellows who enrolled in the program completed

			Sample: 3 NPs		and weekly continuity clinics. The fellows also attend journal club, conferences, grand rounds, written and oral evaluation, and topic reviews. Curriculum: Diagnosis and intervention focused on rheumatologic diseases and conditions. In-depth knowledge of rheumatologic diseases, complexity, and transitioning of care.	the fellowship. Both mentioned aiming to remain employees of the health care centre where they completed their fellowship.
Comola, 2014 Comola, 2021	Case-control	United States	Setting: urology Sample: not mentioned	12 months	Structure: Fellows work in urology clinics and are paired with multiple physicians. As the fellowship progresses, the caseload and autonomy of fellows increase. Fellows participate in clinical rotations with the physicians and residents. The fellows also attend morbidity and mortality conferences, education of urology courses and conferences, journal club, and lectures from guest speakers. Curriculum: Diagnoses, interventions, and knowledge on urologic diseases and conditions. Fellows are expected to be able to manage patients with conditions such as	Higher performance and productivity observed from NPs who completed the fellowship compared to NPs who didn't do the fellowship, including a higher number of clinical visits per day.

| | | | | | urologic cancer, erectile dysfunction, chronic pelvic pain, and recurrent urinary tract infection. Interventions learned include cystoscopy, stent removal, Foley and suprapubic catheter exchange, urethral dilatation, and vasectomy. The curriculum includes the development of critical thinking, laboratory tests interpretation and management, development of a care plan, management of complications, and diagnosis with radiology. | |
| Frissora, 2021 | Cross-sectional (survey) | United States | Setting: psychiatry

Sample: not mentioned | 12 months | Structure: System-based practical approach including clinical rotation, weekly case conference and didactics focus on clinical skills to treat and manage specific cases at the patient, community, and organizational level.

Curriculum: Development of the fellow's knowledge and expertise in patient direct care, available community resources, and mental health agencies. The fellows are expected to gain knowledge and experience in a wide range of mental health services, including ED, inpatient | Improvement of the retention of all graduate fellows within the health care centres where they completed their fellowships. |

					psychiatry, homelessness psychiatry, substance use treatment, serious mental health treatment, geriatric psychiatry, school-based centres, telepsychiatry programs, and neurology.	
Furfari, 2014	Longitudinal (retrospective)	United States	Setting: hospital medicine (geriatrics, oncology, neurology, consultative, perioperative medicine, general medicine services) Sample: 6 NP fellows	12 months	Structure: The fellows spent most of their time within hospital departments composed of general medical patients. Fellows had rotations across hospital services, including consultative medicine, palliative care, geriatric medicine, oncology, and infectious disease. The fellowship also included didactic lessons composed of case studies, and topics focused on clinical decision making and differential diagnosis. Curriculum: The fellowship aimed to improve the NP clinical competencies in caring for adult patients and collaborating with interprofessional teams and physicians. The development of skills regarding quality improvement, process enhancement, communication, and	A cross-sectional survey was sent to the graduated fellows, and 80% felt prepared and 20% felt very prepared to practise independently. The graduated fellows also mentioned that they were able to easily find employment after the fellowship. All fellows took a clinical medicine MCQ test before and after completing the fellowship. The overall score was 57% before the fellowship and 79% after the fellowship.

					resource use was also included.	
Keefe Marcoux, 2019	Cross-sectional	United States	Setting: pediatric (developmental-behavioural pediatric, pediatric physical medicine) Sample: not mentioned	12 months	Structure: The fellowship was composed of clinical practice within pediatric settings. Fellows were involved in grand rounds. A didactic education was also part of the fellowship. Fellows' attended conferences, lectures, and self-paced study. A capstone project was also conducted by each fellow based on their individual interests and the organization needs. Curriculum: The fellows were expected to develop clinical competence, delivery of high quality of care, productivity, increased knowledge, increased confidence, and the completion of a capstone project. The fellowship aimed to develop the skills and knowledge of fellows within the pediatric field related to practice and policy, autonomous practice, health care delivery systems, and technology.	No evaluation reported
Lackner, 2019	Pre-post	United States	Setting: hospital medicine	12 months	Structure: The fellowship was structured with 80% clinical practice and 20% didactic coursework. Each	Six of the graduated fellows enrolled in a position within the health care centre

			Sample: 4 APP fellows		fellow was paired with a physician for the completion of the fellowship. Curriculum: Fellows work in collaboration with physicians in the care of 10 to 13 patients daily. The clinical activities conducted by fellows included admission, management of pharmacotherapy, calling and following consultations, presenting at grand rounds, arranging family meetings, and discharge.	where the fellowship was completed. No difference was found in the median time for school graduation of APN who completed the fellowship versus APN who didn't complete the fellowship.
Wojner Alexandrov, 2009	Descriptive	United States	Setting: neurology, stroke Sample: up to 2009, more than 70 APNs fellows had enrolled into the program.	12 to 24 months	Structure: Each fellow was paired with a physician to complete the fellowship. The NET SMART application was available for fellows and physicians to support the completion of the fellowship. The NET SMART application was composed of 14 modules focused on neurologic care in hospital settings. Curriculum: The 14 modules focused on primary prevention, emergency system, acute assessment and diagnosis, reperfusion therapies, evolving treatment	Fellows and physicians mentioned that they observed an increase in the knowledge, skills, and performance of graduated fellows. Graduated fellows and physicians also mentioned an increase in the fellow practice confidence, improved physician-APN relationships, improvement in the level of physician trust in APN diagnostic judgment and management,

			methods, neurocritical care, complication avoidance measures, secondary prevention, role innovation, and rehabilitation.	recognition of APN neurovascular expertise among several physician specialities, increased respect for the neurovascular APN role, and expanded autonomy in role performance. Graduated fellows also mentioned an increase in the collaboration and networking with interprofessional teams' members.

Residency

Ayavazian, 2021	Longitudinal (retrospective)	United States	Setting: primary care, mental health Sample: between 2016 and 2019, 94 NP residents were register in the program.	12 months	Structure: The residency is based on a competency model composed of 24 core competencies. The program is structured from an instrument adaptable to specific settings, including primary care and mental health. Educational activities are conducted across the duration of the residency. Curriculum: The curriculum is based on the 24 core competencies. A score is calculated to rate all residents on these competencies. Competencies are focused	Cross-sectional findings showed a difference in the competency score of the resident after 6 months in the program and at the end of the program. These findings suggest that the residency program enhances the readiness of graduated NPs to successfully transition into their practice.

					on clinical leadership, knowledge of gerontological disorders and conditions, diagnostic assessments, pharmacotherapy, and military care and cultural knowledge.	
Barnacle, 2021	Longitudinal (retrospective)	United States	Setting: rural setting (clinic, hospital, long-term care facilities, living facilities, independent living facilities) Sample: each cohort includes 4 primary care NPs	12 months	Structure: The residency program was composed of clinical practice and participation of the NP residents in grand rounds. The program included learning activities such as monthly journal club, workshops, and conferences. Curriculum: The learning focused on a wide variety of rural settings including emergency care skills, orthopedic, joint injection, splinting, suturing, fish hook removal, radiology interpretation, intrauterine device placement and Nexplanon insertion training. Conferences and workshops on mental health conditions were also part of the residency curriculum.	The first four residents who started the program successfully completed the residency. By the end of the first year, the productivity of the primary care NP was at the 50th percentile. The four first residents maintained a position within the health care centre where their residency was conducted.
Gaudio, 2011	Descriptive qualitative	United States	Setting: ED Sample: the program accepts 2 NPs per year	15 months	Structure: the residency is composed of several rotations within acute care settings, including emergency medicine, consultation services,	The residents who successfully completed the residency mention that it was "incredibly

| | | | | | neurology, radiology, ICU, internal medicine, and elective. Within each of these settings, residents are paired with physicians and senior NPs and PAs. Residents participate in grand rounds with the interprofessional teams, physicians, residents, and senior NP and PAs. Residents also attend didactic sessions composed of lectures, laboratories, case-based sessions, and conferences. Over the course of the residency, residents must successfully complete three comprehensive examinations in emergency medicine.

Curriculum: Within each setting, residents learn to develop evaluation and treatment plans. Residents also learn the interpretation of radiology and scans and perform clinical and medical intervention (e.g., orthopedic reduction, intubation). | rewarding," "fundamental to professional development," and an "invaluable opportunity." |
| Goudreau, 2011 | Descriptive qualitative | United States | Setting: primary care

Sample: not mentioned | 12 months | Structure: The program is based on several rotations across primary care, outpatient clinics, dermatology, cardiology, hematology/oncology, diabetes clinic, | The feedback from the residents who completed the program is positive. The residents mentioned that the success of the |

					preoperative, ED, orthopedics, women's health, and mental health. Within each of these settings, residents are paired with preceptors. The evaluation of residents was based on a score system and competency achievement.	program is a "journey of learning."
					Curriculum: The competencies included 7 core spheres: clinical competencies (assessment, diagnosis, therapeutic ability), contribution to overall program goal, participation in program improvement activities, interprofessional and interdisciplinary relations, meeting productivity goals of program/clinic, participation in research and program development, and participation in teaching, consultations, and supervision.	
Hollinger-Smith, 1998	Descriptive	United States	Setting: acute care Sample: not mentioned	40 hours	Structure: The residents were paired with a nurse preceptor and a physician preceptor. The residency program was composed of clinical activities such as grand rounds, assessing patients, assessment of patient history and physical condition, family consultation, teaching, and	At the time of the publication, the development of a tool focused on patient and employee satisfaction was ongoing to assess the effect of the residency program.

| | | | | | discussing the management of complex cases. Participation in conferences, research projects, and discussions of the resident's performance was also part of the program.

Curriculum: The curriculum focused on the development of skills and knowledge surrounding the delivery of holistic and comprehensive care at the patient, family, interprofessional team, and organizational levels. Examples of this include enhancing collaboration within interdisciplinary teams, implementation of clinical pathways, enhancing the continuity of care, and improving patient, family, and organizational outcomes. | |
|---|---|---|---|---|---|---|
| Hood, 2018 | Cross-sectional (survey) | United States | Setting: primary care

Sample: the first cohort was composed of 16 students. Subsequent cohorts ranged from 18 to 24 students. | 24 months | Structure: The residency is based on a rotation system across several settings including radiology, ED, primary care, and acute care (optional). Each rotation is framed under a set of core competencies and preceptor supervision. Monthly meetings organized by the hospital are held to discuss selected topics, provide education | Preliminary findings showed that students and preceptors are satisfied with the program. The residency program seems to be an effective and important strategy to enhance NP clinical education. |

| | | | | | content, and enable communication among students, clinical faculty, preceptors, and managers. Didactic lectures are also given to residents weekly to review clinical cases and hold skills workshops.

Curriculum: The curriculum focused on the development of knowledge and skills to manage primary care illness and conditions. Clinical skills are taught including the interpretation of radiology tests and laboratory results, the management of urgent problems and diseases, learning of sterile techniques, surgical procedures, and understanding the postoperative needs of patients after a surgery. | |
| McGuiness, 2020 | Descriptive | United States | Setting: psychiatry, mental health

Sample: 3 residents per class since 2014. Between 2014 and 2020, 17 residents completed the program. | 12 months | Structure: The residency is conducted under a clinic offering 15 appointments per clinic session. Within the clinic, residents manage patients with mental illness and conditions, and conduct scholarly projects. Projects focus on quality improvement and contribute to the body of knowledge of the speciality. | A reported benefit of the program observed was cost avoidance. For the year of the residency, a savings of 28% over the cost of hiring a licensed NP was observed. |

					Curriculum: Knowledge and expertise related to veteran-centric topics are taught, including suicide among veterans, trauma-informed care, traumatic brain injury, post-traumatic stress disorder, and substance use disorder. The NP competencies included in the curriculum are: practice-based learning, quality improvement and evidence-based learning, communication, conflict management, professional roles and responsibilities, ethical decision making, health delivery systems, resource utilization, information technology, stress management, clinical leadership, and professional development.	
Messing, 2020	Descriptive	United States	Setting: trauma, critical care	12 months	Structure: The program was based on a rotation across several acute care settings including trauma, ICU, palliative care, and elective settings. Within each setting, NP residents are expected to fill the same role as physician residents, including taking calls, assessing complex critical cases, and assisting physicians and interprofessional teams.	The residency allowed the creation of NP grand rounds, allowing the gathering of NP and PAs to discuss with each other and share new speaking skills and knowledge transfer. The grand rounds also strengthen the relationship between the health care
			Sample: not mentioned			

					The clinical practice included participating in daily morning lectures, grand rounds, management of the floor patients, and responding to trauma situations. The residency program also included weekly didactics, courses, conferences, and skills laboratories.	centre and the university. The residency program also highlighted the importance of multidisciplinary education in trauma settings.
Painter, 2019	Cross-sectional	United States	Setting: primary care Sample: 3 NPs	6 months	Curriculum: The curriculum is based on monthly modules and weekly segments. Each week would carry a theme, such as abdominal trauma, anesthesia, pain therapy, or mechanical ventilation. Structure: In the program, 50% of the time was spent in a primary care setting delivering care to patients with acute and chronic conditions. Residents also delivered preventive care. The other 50% was dedicated to didactic sessions, lectures, and small group learning. The residents participated in 11 learning sessions focused on orthopedic, dermatology, cardiology, pneumology, endocrinology, rheumatology, women's health, gastroenterology,	The feedback from the NP residents was positive. High satisfaction was observed from the NP residents, the faculty, and the stakeholders. Three NP residents accepted permanent positions within the health care centres after their residency. The completion of the residency also facilitated the transition into independent practice of graduated NPs, as well as their

					nephrology, infectious disease, and radiology.	confidence and productivity.
					Curriculum: The curriculum focused on competencies, knowledge, and skills needed to practise within primary care settings, including diagnosis, evaluation and management of chronic diseases, pain management, billing and coding, health maintenance, diagnostic imaging, population health, nutrition, electrocardiogram and chest X-ray interpretation, and childhood immunization.	
Sargent, 2013	Cross-sectional (survey)	United States	Setting: primary care Sample: 5 NPs	12 months	Structure: The residency program includes clinical practice with a preceptor within a family medicine department. Each NP resident is paired with a preceptor whose role is to mentor, instruct, support, and teach the resident. The clinical practice is held under patient sessions, where the preceptor and NP resident assume the responsibility of a caseload of patients. NP residents also participate in chart rounds and grand rounds with the preceptor and the interprofessional team. The	At the time of publication, a tool was being created to assess the benefits of the program. The tool was called the "NP Clinical Confidence Assessment self-evaluation tool" and focused on the productivity of residents. The development of the tool was ongoing.

| | | | | | residency program also includes monthly didactic classrooms. Workshops, lectures, and courses focus on topics related to the provision of primary care. NP residents participate in administrative work, including organizational meetings and commitment work to enhance their understanding of the structure and function of the health care centre.

Curriculum: The curriculum focuses on the delivery of care for a primary care clientele. Competencies such as the use of evidence-based guidelines for decision making and patient care to improve the practice-based learning are taught. Competencies related to professionalism, patient-clinical relationships, and expanding their ability to handle difficult situations with patients are also taught. | |
| --- | --- | --- | --- | --- | --- | --- |
| Shelby, 2008 | Descriptive | United States | Setting: dermatology

Sample: In 2008, 2 residents were enrolled in the program. | 36 months | Structure: The program is composed of a standardized and formal curriculum, evidence-based projects, and clinical practice. Residents are expected to present grand rounds, attend lectures, | No evaluation reported |

					submit scientific publications, obtain teaching experience as guest lecturers, and participate in the department research program. Curriculum: The residents are expected to gain an in-depth understanding of the care delivered to patients with dermatological illness and conditions, including how to manage acute and chronic dermatologic diseases, collaborate with interprofessional teams, understand pharmacological and physical treatments, and execute basic dermatologic surgical techniques.	
Thabault, 2015	Pilot-test	United States	Setting: retail health clinic, primary care Sample: 7 NPs	12 months	Structure: The residency combined clinical practice supervised by a preceptor and didactic lessons. Each NP resident was coached by a preceptor. For the first month of the residency, the NP resident and the preceptor assessed and treated the same patient. Afterward, the NP resident had weekly meetings with the preceptor to review and discuss cases. The didactic lessons included patient case review, monthly conferences, webinars, and	The participants of the program gave their feedback. Graduated NPs and preceptors mentioned that the session with the preceptors was very gratifying for both. Graduated NP residents mentioned that they gained confidence and experience in their own independent practice. NP residents also

					job shadow opportunities. NP residents also needed to complete a doctoral level course taught by the affiliated university of the program.	mentioned that they got a better understanding of the management of retail health practice.
					Curriculum: The residency program aimed to give graduated NPs an opportunity to further their education and competencies, including advancement of collaborative relational skills such as negotiation, conflict resolution and feedback, obtaining a deeper understanding of the interrelatedness of organizational/system components, approaches to solving problems and change, and exploring retail health care delivery and organizational models. The program also aimed to help NP residents to develop innovative knowledge and skills, lead, facilitate patient-centred teamwork, implement evidence-based practice guidelines and/or quality improvement within the organization and community.	
Writz Rugen, 2018	Cross-sectional (survey)	United States	Setting: primary care	12 months	Structure: The VA CoEPCE program is a framework available for	A qualitative study was undertaken to obtain feedback

	Sample: 38 NPs participated in the program across five centres from 2012 to 2015	health care centres across the United States to implement and offer residency programs for NPs. In 2018, centres in Boise, Cleveland, San Francisco, Seattle, and West Haven, VA, facilities were delivering residency programs. Health care centres have the liberty to design the program depending on their needs and resources. Curriculum: The program focuses on improving team-based primary care. Sites are expected to teach residents to gain clinical competencies including decision making, sustaining relationships, interprofessional collaboration, and performance improvement.	from the graduated NP residents. Residents suggested that the program supported their transition into their independent practice. NPs mentioned that they gained competencies in delivering patient-centred care that persisted over time.

Note. APN = advance practice nurse; APP = advanced practice provider; ED = emergency department; ECG = electrocardiogram; EM = emergency medicine; ENP = emergency nurse practitioner; ICU = intensive care unit; MCQ = multiple-choice question; NP = nurse practitioner; PA = physician assistant.

Appendix B

Quality Score Appraisal: TIDieR Checklist

Type of program	First author, year of publication	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	Additional comment	Score
Transition to practice	Dowling Evans, 2017	1	1	0	1	1	1	1	1	N/A	N/A	N/A	N/A	No material available	7
Transition to practice	Erickson, 2021	1	1	0	1	1	1	0	1	N/A	N/A	N/A	N/A	No information on mentor's background and training, no material available	6
Transition to practice	Kilgore, 2019	1	1	0	1	0	1	0	0	N/A	N/A	N/A	N/A	No access to the handbook used to support the trainees during the program. Vague description of the mentor background. Vague description of the structure of the program (e.g., grand rounds, rotations). No description of the setting where the program took place.	4
Transition to practice	Langley, 2018	1	1	1	1	1	1	1	1	N/A	N/A	N/A	N/A	Very detailed description of the 5 phases of the program.	8

Fellowship	Alencar, 2018	0	1	0	1	0	0	0	0	N/A	N/A	N/A	N/A	Title does not mention the fellowship in oncology, material not available and very vague, preceptor background very vague, format of the program very vague. No specifications on the components of the program (e.g., grand round, rotation). No information on the clinical settings where the fellowship takes place.	2
Fellowship	Bowen, 2018	1	1	1	1	1	1	1	1	N/A	N/A	N/A	N/A	Thesis	8
Fellowship	Caldwell, 2018	1	0	0	1	0	1	1	1	N/A	N/A	N/A	N/A	Abstract from a conference proceeding. No information on background and the relevance of a fellowship program at Duke. No information on material. No information on preceptors or managers of the program. Format and content of the fellowship are very vague.	5
Fellowship	Comola, 2014; Comola, 2021	1	1	0	1	1	1	1	1	N/A	N/A	N/A	N/A	No information on the material used to	7

													support the fellowship program.	
Fellowship	Frissora, 2021	1	1	0	1	0	1	1	1	N/A	N/A	N/A	N/A	No information on the provider of the fellowship. No information on the material used to support the fellowship.	6
Fellowship	Furfari, 2014	1	1	0	1	0	1	1	1	N/A	N/A	N/A	N/A	No information provided on material used for the program. No information on the provider of the intervention.	6
Fellowship	Keefe Marcoux, 2019	1	1	0	1	0	1	1	1	N/A	N/A	N/A	N/A	No information provided on material used for the program. No information on the provider of the intervention.	6
Fellowship	Lackner, 2019	1	1	0	1	0	1	1	1	N/A	N/A	N/A	N/A	No information provided on material used for the program. No information on the provider of the intervention.	6
Fellowship	Wojner Alexandrov, 2009	1	1	1	1	1	1	1	1	N/A	N/A	N/A	N/A	Very well explained, a lot of details on the process, content, and structure of the intervention. Conceptual model presented.	8

Residency	Ayavazian, 2021	1	1	1	1	1	1	1	1	N/A	N/A	N/A	N/A	Well explained, well described. Validation of a tool to assess the NP competencies during the residency.	8
Residency	Barnacle, 2021	1	1	0	1	1	1	1	1	N/A	N/A	N/A	N/A	No material available	7
Residency	Gaudio, 2011	1	1	0	1	1	1	1	1	N/A	N/A	N/A	N/A	No material available	7
Residency	Goudreau, 2011	1	1	0	1	0	1	1	1	N/A	N/A	N/A	N/A	No information on material used for the delivery of the program, no information on the provider and mentor of NP residents,	6
Residency	Hollinger-Smith, 1998	1	1	1	1	1	1	1	1	N/A	N/A	N/A	N/A	Very well detailed. Material provided,	8
Residency	Hood, 2018	1	1	0	1	1	1	1	1	N/A	N/A	N/A	N/A	No information on material used to deliver the residency. Providers very well described.	7
Residency	McGuiness, 2020	1	1	0	1	0	1	1	1	N/A	N/A	N/A	N/A	No information on material used for the delivery of the program, no information on the provider and mentor of NP residents.	6
Residency	Messing, 2020	1	1	0	1	0	1	1	1	N/A	N/A	N/A	N/A	No information on material used and no information on provider.	6

		#1	#2	#3	#4	#5	#6	#7							
Residency	Painter, 2019	1	1	0	1	1	1	1	1	N/A	N/A	N/A	N/A	No information on material used for the residency program.	7
Residency	Sargent, 2013	1	1	1	1	1	1	1	1	N/A	N/A	N/A	N/A	Very well detailed, very well described, all information provided: provider, material, etc.	8
Residency	Shelby, 2008	1	1	1	1	0	1	1	1	N/A	N/A	N/A	N/A	No information on the providers mentoring and managing the program.	7
Residency	Thabault, 2015	1	1	0	1	0	1	1	1	N/A	N/A	N/A	N/A	No information on the provider and no information on material used for the residency program.	6
Residency	Writz Rugen, 2018	1	1	1	1	0	1	1	1	N/A	N/A	N/A	N/A	No information on the provider of the residency program. Assessment of a tool for the residency program.	7

Note.

#1 Provide the name or a phrase that describes the intervention.

#2 Describe any rationale, theory, or goal of the elements essential to the intervention.

#3 Materials: Describe any physical or informational materials used in the intervention, including those provided to participants or used in intervention delivery or in training of intervention providers. Provide information on where the materials can be accessed (such as online appendix, URL).

#4 Procedures: Describe each of the procedures, activities, and/or processes used in the intervention, including any enabling or support activities.

#5 For each category of intervention provider (such as psychologist, nursing assistant), describe their expertise, background, and any specific training given.

#6 Describe the modes of delivery (such as face to face or by some other mechanism, such as internet or telephone) of the intervention and whether it was provided individually or in a group.

#7 Describe the type(s) of location(s) where the intervention occurred, including any necessary infrastructure or relevant features.

#8 Describe the number of times the intervention was delivered and over what period of time including the number of sessions, their schedule, and their duration, intensity, or dose.

#9 If the intervention was planned to be personalised, titrated or adapted, then describe what, why, when, and how.

#10 If the intervention was modified during the course of the study, describe the changes (what, why, when, and how).

#11 Planned: If intervention adherence or fidelity was assessed, describe how and by whom, and if any strategies were used to maintain or improve fidelity, describe them.

#12 Actual: If intervention adherence or fidelity was assessed, describe the extent to which the intervention was delivered as planned.

Source: 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. https://doi.org/10.1136/bmj.g1687